HISTORY OF SOYBEANS AND SOYFOODS

IN CENTRAL ASIA (1876-2008):

EXTENSIVELY ANNOTATED

BIBLIOGRAPHY AND SOURCEBOOK

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BIBLIOGRAPHY AND SOURCEBOOK

Armenia, Azerbaijan, Transcaucasia, Georgia, Kazakhstan

Kyrgyzstan, Tajikistan, Turkistan / Turkestan, Turkey, Uzbekistan

Compiled

by

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DEDICATION AND ACKNOWLEDGMENTS

This book is dedicated to Friedrich Haberlandt, A.E. Wuchino, and Frank N. Meyer - pioneers in this field.

Part of the enjoyment of writing a book lies in meeting people from around the world who share a common interest, and in learning from them what is often the knowledge or skills acquired during a lifetime of devoted research or practice. We wish to give deepest thanks...

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This book, now doubt and alas, has its share of errors. These, of course, are solely the responsibility of William Shurtleff.

INTRODUCTION

Brief Chronology of Soybeans and Soyfoods in Central Asia

1870 – Kazakhstan: Soybeans are first cultivated. One of the Chinese nationalities, the Dungan (the Russian term for the Hui, China's second largest minority), resettled from Western China to the boundaries of the Semirechenski oblast', which is inside today's Kazakhstan. They brought with them many varieties of soybean, a crop that was unknown there at that time. They began to grow soybeans in small quantities. In a number of places this crop found a new homeland for itself, but only among the Dungans themselves – not among the Russians, Kazakhs, or Kirghiz (Lobanov 1934).

1873 – Transcaucasia: Prof. Friedrich Haberlandt of Vienna collects black soybeans from Transcaucasia at the Transcaucasia exhibit in the Vienna World Exposition. Transcaucasia is a region just south of the Caucasus Mountains roughly equal to that occupied in 2008 by the countries of Armenia, Azerbaijan, and Georgia. The soybeans were almost certainly cultivated in Transcaucasia since they were seen as being important enough to take to the world exposition (Haberlandt 1876, Feb. 26).

1898 – Republic of Georgia: Soybeans are cultivated in the agricultural school at Kutaisi (Wuchino 1901).

1901 – Wuchino, of Georgia, says that soybeans were first cultivated in Transcaucasia in the 1870s.

1910 March – Soy coffee made by a firm named Argo or Argot is now being made at Sta. Quirili (Kurile), on the railroad from Batoum [probably Batumi] to Tiflis, Republic of Georgia. This is the earliest known commercial soy product made in Central Asia (Letter from Frank N. Meyer in Tiflis, 15 March 1915).

1911 – Soybeans are cultivated for a second time in the Republic of Georgia. 500 tons are shipped at a price of 1.10 rubles per pood. This prices is very remunerative to farmers and, judging from the quantity of seed beans retained for planting, the next crop will amount to 16,000 tons. These are the first statistics given on soybean production in Central Asia. (Heingartner 1911).

1912 – Turkistan / Turkestan: Soybean varieties are introduced to the USA from Chinese Turkestan. They were probably being cultivated there at the time (USDA Bureau of Plant Industry, Inventory No. 28. See #38102-38104).

1918 – Turkey: In a report titled *Reconstruction in Turkey*, published after World War II, soybeans are recommended for crop rotation and as a soil builder (Hall 1918).

1930 – Armenia: Soybeans are first cultivated (Tedoradze 1963).

1931 – Azerbaijan: Soybeans are first cultivated (Tedoradze 1963).

1967 – Uzbekistan: Soybeans are first cultivated (Ivanov 1973).

1969 – Turkey: Soybeans are first cultivated (Kuznetsova 1972),

1970 – Tajikistan: Soybeans are first cultivated (Karimov 1974).

1990 – Kazakhstan : Harvested 23,000 ha in 1990, 18,000 ha in 1991, and an estimated 19,000 ha in 1992.

1990 – Republic of Georgia: Harvested 8,000 ha in 1990, 6,000 ha in 1991, and an estimated 6,000 ha in 1992.

1990 – Azerbaijan: Harvested 1,000 ha in 1990, 1,000 ha in 1991, and an estimated 1,000F ha in 1992.

1995 – Uzbekistan: Soybeans start to be crushed. Statistics show the following amounts (in 1,000 metric tons) were crushed:

1995/96 = 100.
1996/97 = 100.
1997/98 = 175 (peak).
1998/99 = 120.
1999/2000 = 33.
2000 /2001 = 54.
2001/2002 = 65.
2002/2003 = 70.
2003/2004 = 1.
2004/2005 = 5.
2005/2006 = 6.
2006/2007 = 5.
2007/2008 = 5.

These are the first soybeans crushed in Central Asia (USDA Foreign Agricultural Service database).

2006 – Tajikistan: Tofu is now being made and green vegetable soybeans are now being grown and consumed by ethnic Korean immigrants (Ashraf 2006).

2006 - Kazakhstan is the largest soybean producer in Central Asia with 48,000 tonnes (metric tons), followed closely by Turkey with 47,300 tonnes. Other Central Asian nations with relatively small soybean production are Georgia, Azerbaijan, Tajikistan, and Kyrgystan.

ABOUT THIS BOOK

This is the most comprehensive book ever published about Cooperative Soybean Processing. It has been compiled, one record at a time over a period of 33 years, in an attempt to document the history of soy this region. It is also the single most current and useful source of information on this subject.

This is one of more than 50 books compiled by William Shurtleff and Akiko Aoyagi, and published by the Soyinfo Center. It is based on historical principles, listing all known documents and commercial products in chronological order. It features detailed information on:

- 25 different document types, both published and unpublished.
- 152 published documents - extensively annotated bibliography. Every known publication on the subject in every language.
- 13 original Soyinfo Center interviews and overviews never before published.
- 15 unpublished archival documents
- 2 commercial soy products.

Thus, it is a powerful tool for understanding the development of this subject from its earliest beginnings to the present.

Each bibliographic record in this book contains (in addition to the typical author, date, title, volume and pages information) the author's address, number of references cited, original title of all non-English language publications together with an English translation of the title, month and issue of publication, and the first author's first name (if given). For most books, we state if it is illustrated, whether or not it has an index, and the height in centimeters.

For commercial soy products (CSP), each record includes (if possible) the product name, date of introduction, manufacturer's name, address and phone number, and (in many cases) ingredients, weight, packaging and price, storage requirements, nutritional composition, and a description of the label. Sources of additional information on each product (such as advertisements, articles, patents, etc.) are also given.

A complete subject/geographical index is also included.

ABBREVIATIONS USED IN THIS BOOK

A&M = Agricultural and Mechanical
Agric. = Agricultural or Agriculture
Agric. Exp. Station = Agricultural Experiment Station
ARS = Agricultural Research Service
ASA = American Soybean Association
Assoc. = Association, Associate
Asst. = Assistant
Aug. = August
Ave. = Avenue
Blvd. = Boulevard
bu = bushel(s)
ca. = about (circa)
cc = cubic centimeter(s)
Chap. = Chapter
cm = centimeter(s)
Co. = company
Corp. = Corporation
Dec. = December
Dep. or Dept. = Department
Depts. = Departments
Div. = Division
Dr. = Drive
E. = East
ed. = edition or editor
e.g. = for example
Exp. = Experiment
Feb. = February
fl oz = fluid ounce(s)
ft = foot or feet
gm = gram(s)
ha = hectare(s)
i.e. = in other words
Inc. = Incorporated
incl. = including
Illust. = Illustrated or Illustration(s)
Inst. = Institute
J. = Journal
J. of the American Oil Chemists' Soc. = Journal of the American Oil Chemists' Society
Jan. = January
kg = kilogram(s)
km = kilometer(s)
Lab. = Laboratory
Labs. = Laboratories
lb = pound(s)
Ltd. = Limited
mcg = microgram(s)
mg = milligram(s)
ml = milliliter(s)
mm = millimeter(s)
N. = North
No. = number or North
Nov. = November
Oct. = October
oz = ounce(s)
p. = page(s)
P.O. Box = Post Office Box
Prof. = Professor
psi = pounds per square inch
R&D = Research and Development
Rd. = Road
Rev. = Revised
RPM = revolutions per minute
S. = South
SANA = Soyfoods Association of North America
Sept. = September
St. = Street
tonnes = metric tons
trans. = translator(s)
Univ. = University
USB = United Soybean Board
USDA = United States Department of Agriculture
Vol. = volume
V.P. = Vice President
vs. = versus
W. = West
°C = degrees Celsius (Centigrade)
°F = degrees Fahrenheit
> = greater than, more than
< = less than

HOW TO MAKE THE BEST USE OF THIS BOOK

Here are a few tips to help you get the most out of the information contained in this book.

Chronological Order: The publications and products in this book are listed with the earliest first and the most recent last. Within each year, references are sorted alphabetically by author. If you are interested in only current information, you might want to start reading at the back, just before the indexes.

How to Use the Three Indexes: A subject and country index, an author/company index, and a language index are located at the back of this book. They will help you to go directly to the specific information that interests you. Browse through them briefly to familiarize yourself with their contents and format.

Each record in the book has been assigned a sequential number, starting with 1 for the first/earliest reference. It is this number, not the page number, to which the indexes refer. A publication will typically be listed in each index in more than one place, and major documents may have 30-40 subject index entries. Thus a publication about the nutritional value of tofu and soymilk in India would be indexed under at least four headings in the subject and country index: Nutrition, Tofu, Soymilk, and Asia, South: India.

Note the extensive use of cross references to help you: e.g. “Bean curd. See Tofu.”

In the author/company index, a separate entry is given for each author and company. If there are no personal authors, the corporate author (typically an organization, such as UNESCO or the USDA) will be indexed. If there are no personal or corporate authors, the serial/periodical name will be considered the author, as in an article from Time magazine.

Countries and States/Provinces: Every record contains a country keyword. Most USA and Canadian records also contain a state or province keyword, indexed at “U.S. States” or “Canadian Provinces and Territories” respectively. All countries are listed under their region or continent. Thus for Egypt, look under Africa: Egypt, and not under Egypt. For Brazil, see the entry at Latin America, South America: Brazil. For India, see Asia, South: India. For Australia see Oceania: Australia.

Most Important Documents: Look in the Index under “Important Documents -.”

Organizations: Many of the larger, more innovative, or pioneering soy-related companies appear in the subject index – companies like ADM / Archer Daniels Midland Co., AGP, Cargill, Dupont, Kikkoman, Monsanto, Tofutti, etc. Worldwide, we index many major soybean crushers, tofu makers, soymilk and soymilk equipment manufacturers, soyfoods companies with various products, Seventh-day Adventist food companies, soy protein makers (including pioneers), soy sauce manufacturers, soy ice cream, tempeh, soynut, soy flour companies, etc.

Other key organizations include Society for Acclimatization (from 1855 in France), American Soybean Association, National Oilseed/Soybean Processors Association, Research & Development Centers (Peoria, Cornell), Meals for Millions Foundation, and International Soybean Programs (INTSOY, AVRDC, IITA, International Inst. of Agriculture, and United Nations). Pioneer soy protein companies include Borden, Drackett, Glidden, Griffith Labs., Gunther, Laucks, Protein Technologies International, and Rich Products.

Soyfoods: Look under the most common name: Tofu, Miso, Soymilk, Soy Ice Cream, Soy Cheese, Soy Yogurt, Soy Flour, Green Vegetable Soybeans, or Whole Dry Soybeans. But note: Soy Proteins: Isolates, Soy Proteins: Textured Products, etc.

Industrial (Non-Food) Uses of Soybeans. Look under “Industrial Uses ...” for more 17 subject headings.

Pioneers - Individuals: Laszlo Berczeller, Henry Ford, Friedrich Haberlandt, A.A. Horvath, Englebert Kaempfer, Mildred Lager, William Morse, etc. Soy-Related Movements: Soyfoods Movement, Vegetarianism, Health and Dietary Reform Movements (esp. 1830-1930s), Health Foods Movement (1920s-1960s), Animal Welfare/ Rights. These are indexed under the person’s last name or movement name.

Nutrition: All subjects related to soybean nutrition (protein quality, minerals, antinutritional factors, etc.) are indexed under Nutrition, in one or more of 14 subcategories.

Soybean Production: All subjects related to growing, marketing, and trading soybeans are listed under Soybean Production. E.g. Soybean Production: Nitrogen Fixation, or Soybean Production: Plant Protection, or Soybean Production: Variety Development.

Other Special Index Headings: Browsing through the subject index will show you many more interesting subject headings, such as Industry and Market Statistics, Information (incl. computers, databases, libraries), Standards, Bibliographies (works containing more than 50 references), and History (soy related).

Commercial Soy Products: All Soyinfo Center sourcebooks that focus on a specific soyfood (tofu, soymilk, tempeh, miso, etc.) or geographical area (Africa, Japan) contain extensive information about every known commercial soyfood product - a unique feature. We list the product name, manufacturer's name, address, and phone number, year and month of introduction, ingredients, weight-packaging-price, how stored, nutritional analysis, and documentation on sources of additional information on that product.

SoyaScan Notes: This is a term we have created exclusively for use with this database. A SoyaScan Notes Interview contains all the important material in short interviews conducted and transcribed by William Shurtleff. This material has not been published in any other source. Longer interviews are designated as such, and listed as unpublished manuscripts. A transcript of each can be ordered from Soyinfo Center Library. A SoyaScan Notes Summary is a summary by William Shurtleff of existing information on one subject.

"Note:" When this term is used in a record's summary, it indicates that the information which follows it has been added by the producer of this database.

Asterisks at End of Individual References.
1. An asterisk (*) at the end of a record means that Soyinfo Center does not own that document. Lack of an asterisk means that Soyinfo Center owns all or part of the document.
2. An asterisk after eng (eng*) means that Soyinfo Center has done a partial or complete translation into English of that document.
3. An asterisk in a listing of the number of references [23* ref] means that most of these references are **not** about soybeans or soyfoods.

Documents Owned by Soyinfo Center. Lack of an * at the end of a reference indicates that the Soyinfo Center Library owns all or part of that document. We own roughly three fourths of the documents listed. Photocopies of hard-to-find documents or those without copyright protection can be ordered for a fee. Please contact us for details.

Document Types: The SoyaScan database contains 51 different types of documents, both published (books, journal articles, patents, annual reports, theses, catalogs, news releases, videos, etc.) and unpublished (interviews, unpublished manuscripts, letters, summaries, etc.).

Customized Database Searches: This book was printed from SoyaScan, a large computerized database produced by the Soyinfo Center. Customized/ personalized reports are "The Perfect Book," containing exactly the information you need on any subject you can define, and they are now just a phone call away. For example: Current statistics on tofu and soymilk production and sales in England, France, and Germany. Or soybean varietal development and genetic research in Third World countries before 1970. Or details on all tofu cheesecakes and dressings ever made. You name it, we've got it. For fast results, call us now!

BIBLIO: The software program used to produce this book and the SoyaScan database, and to computerize the Soyinfo Center Library is named BIBLIO. Based on Advanced Revelation, it was developed by Soyinfo Center, Tony Cooper and John Ladd.

History of Soybeans and Soyfoods: This book has a corresponding chapter in our forthcoming scholarly work titled History of Soybeans and Soyfoods (4 volumes). Manuscript chapters from that book are now available on our website, www.soyinfocenter.com.

About the Soyinfo Center. An overview of our publications, computerized databases, services, and history is given on our website.

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HISTORY OF SOY IN CENTRAL ASIA

1. Haberlandt, Friedrich. 1876. Der Anbau der rauhhaarigen Soja oder Sojabohne (Soja hispida Moench) [The cultivation of the hirsute soybean]. *Wiener Landwirthschaftliche Zeitung* 26(9):87-89. Feb. 26. [Ger]
• ***Summary:*** Contains a detailed account of Haberlandt's first trials and analyses of the oil and protein content of the soybean's seeds.

"Among the seeds that the teaching staff of agronomy at the Royal College of Agriculture *(Lehrkanzel des Pflanzenbaues an der Wiener Hochschule für Bodencultur)* in Vienna, acquired at the Viennese World Exposition of 1873, were a number of varieties of soya (Soja), gathered from the Chinese, Japanese, Mongolian, Transcaucasian, and East Indian expositions." An illustration shows a soybean plant with pods.

Note 1. This is the earliest document seen (June 2001) by Prof. Haberlandt about soybeans. Also subsequently published in *Biedermann's Centralblatt* (June 1876, p. 441-45).

Note 2. This is the earliest document seen (July 2002) concerning soybeans in Austria, or the cultivation of soybeans in Austria. This document contains the earliest date seen for soybeans in Austria (1873), or the cultivation of soybeans in Austria (1875). The source of these soybeans is the various expositions at the World Exposition in Vienna of 1873.

Note 3. This is the earliest document seen (April 2008) concerning soybeans in Transcaucasia, or the cultivation of soybeans in Transcaucasia–which is a region roughly equal to that occupied in 2008 by the countries of Armenia, Azerbaijan, and Georgia. This document contains the earliest date seen for soybeans in Transcaucasia, or the cultivation of soybeans in Transcaucasia (1873). The source of these soybeans is unknown. We cannot be certain that soybeans were being cultivated in Transcaucasia by 1873, although Haberlandt says in 1878 that these soybeans were "from Transcaucasia" so they were almost certainly being cultivated there–especially since they were seen as being important enough to take to this Viennese World Exposition. Moreover, Wuchino (1901) states that soybeans were first grown in Transcaucasia in the 1870s. We learn later (1878) that Haberlandt got black soybeans from the Transcaucasian exposition.

Note 4. This is the earliest document seen (May 2008) concerning soybeans in Central Asia (Transcaucasia), or the cultivation of soybeans in Central Asia. This document contains the 2nd earliest date seen for soybeans in Central Asia, or the cultivation of soybeans in Central Asia (1873). The source of these soybeans is unknown.

Note 5. This is the earliest document seen concerning soybeans in Mongolia, or (probably) the cultivation of soybeans in Mongolia (one of two documents). It is possible, but unlikely, that these soybeans came from the nation that since 1911 has been called Mongolia (formally Mongolian People's Republic, also called Outer Mongolia). It is more likely that they came from what is today called Inner Mongolia, which is part of China, an autonomous region in northern China bounded on the north by the Mongolian People's Republic. Address: Prof., Wiener Hochschule fuer Bodencultur, Vienna.

2. Haberlandt, Friedrich. 1878. Die Sojabohne: Ergebnisse der Studien und Versuche ueber die Anbauwuerdigkeit dieser neu einzufuehrenden Culturpflanze [The soybean: Results of studies and trials on the potential for growing this newly introduced crop plant]. Vienna, Austria-Hungary: Carl Gerold's Sohn. ii + 119 p. 28 cm. [30 ref. Ger]
• ***Summary:*** This is the first book about soybeans written in the western world. An extremely important, classic work, it discusses the introduction of soybeans to Europe, by many cooperators.

Contents: Foreword. Part 1 (p. 1-15). Introduction: The possibility of increasing the number of our cultivated plants from the legume family. Prospects opened to us by the cultivation of soybeans. Previous soybean agronomic trials in Hohenheim, Bamberg (by Dr. A. Rauch using seeds from Japan supplied by Siebold), Hainsberg-Deuben in Saxony *(Sachsen)* (by Carl Berndt, a velvet manufacturer), and Coswig bei Messen (in 1872) in Germany. Acclimatization of the soybean in France. Sporadic, heretofore unnoticed occurrences of soybeans in South Tirol (also spelled Tyrol), Istria (or Istrian Peninsula; now in Slovenia), Dalmatia [now mostly in Croatia; see Note below], and Italy. The collection of soybeans, obtained at the Vienna World Exposition *(Wiener Weltausstellung)* of 1873 from China, Japan, Mongolia, Transcaucasia, and Tunis [North Africa], and their use in wider agronomic trials. Enumeration of authors who have cited *(anführen)* the soybean under different names and planned for its dissemination. Characteristics of the soybean plant. Description of the seeds and their anatomical structure. Their high nutritional value in comparison with ordinary legumes. Their use in Japan, according to Kaempfer. Obtaining oil and cake from the soybean.

Part 2. Agronomic trials in the years 1875 and 1876 (p. 16-35; see Document part for details). Source of the supply of the various soybean varieties used in the original trials. Trials at the Royal College of Agriculture *(Hochschule für Bodencultur)* in Vienna in 1875. Results from 1876 from Hungarian Altenburg and Gross-Becskerek in Hungary, in St. Peter bei Graz in Steiermark [Styria], in Napagedl in Mähren [Moravia; in the Czech Republic as of Jan. 1993], in Sichrow, Swijan, Darenic, Tetschen-Liebwerd in Böhmen [Bohemia], in Bukowina [Bukovina or Bucovina, a former Austrian crownland, as of 1994 divided among the Ukraine and Romania], in Proskau [now Proszkow in today's Poland] in Preussisch-Schlesien [Prussian Silesia], and in the experimental garden at the Royal School of Agriculture. Comparison of the resulting seeds with the original seeds. Chemical analysis of the seeds and straw. Evidence of the "heat units" (Wärmesummen; "warm temperature summation" or "warm sum," similar to U.S. maturity groups) which the soybean was able to use for their development in Vienna, St. Peter, Tetschen-Liebwerd, and Proskau.

Part 3. Agronomic trials in the year 1877 (p. 36-86). Results of the soybean agronomic trials in Austria-Hungary, Germany, etc. in 1877. Extracts from 14 reports of various trial locations in lower Austria, and 11 trial locations in Mähren [Moravia]. Extracts from 19 reports from Bohemia, 10 from Austrian Silesia (Oesterr.-Schlesien), Galizien [Galicia; a former Austrian crownland; after World War II the western half was made part of Poland and the eastern half was made part of the Ukranian S.S.R. in the Soviet Union], Bukowina, and Russian-Poland, 6 reports from upper Austria, Salzburg, and Tirol, 11 reports from Steiermark, Krain [Carniola; now mostly in Slovenia], and Kärnthen [Kaernten or Carinthia, an Austrian crownland; now a state of southern Austria, bordering on Italy and Yugoslavia], 12 from Istria, Dalmatia, and the Grafschaft [county and earldom] of Görz, 40 from Hungary and Croatia [formerly part of Yugoslavia], 23 from Germany, 1 from Switzerland, and 1 from Holland.

Part 4 (p. 87-113). Comparison of the value of the three different colors of soybeans (yellow, reddish-brown, and black) used in the trials. Time of planting. Ability of hydrated seeds to withstand freezing. Width of planting. Condition and care of the soil. Requirements for light and warmth. Need for moisture. Time that the harvests took place and general remarks on the weather in 1877. The quantity of planted and harvested soybeans in 1877 and the yields. Animals [incl. insects, especially the so-called Drahtwurm, the larva of *Agriotes segetis]* and parasites that damage soybeans. Chemical composition of the soybeans [by Dr. Mach and asst. Portele in S. Michele {South Tirol}, and by Caplan in Vienna]. Feeding trials with the straw and preparation of the seeds as a food for humans. Retrospective and conclusion.

Note 1. Austria-Hungary is a former "dual monarchy" in central Europe formed in 1867. It included what is now Austria and Hungary, Bohemia, Moravia, Bukovina, Transylvania [now in northwestern and central Romania], Carniola, Kustenland, Dalmatia, Croatia, Fiume [later named Rijeka in Croatia], and Galicia. After the treaty of Berlin in 1878, it administered the Turkish provinces of Bosnia and Herzegovina, which it annexed in 1908. It was a member of the triple alliance with Germany and Italy from 1882 to 1914. It collapsed as a result of defeat in World War I. In 1918 it was divided into many independent republics, including Austria, Hungary, and Czechoslovakia.

Note 2. Dalmatia, a former Austrian crownland, is a region on the Adriatic Sea, largely in today's Croatia. It extends from Zadar on the north to near the border of Montenegro, and contains a small southern portion of Bosnia and Herzegovina (Jan. 1993). It is mountainous and contains many island and good harbors.

Note 3. Carniola (German: Krain) is a region that lies in today's Slovenia. The chief town is Ljubljana. It is bounded on the west by the Julian Alps and on the northwest by east end of the Carnic Alps. It was a duchy of Austria until 1849, then an Austrian crownland from 1849 to 1918. It was divided after World War I with 80% of the area going to Yugoslavia and 20% going to Italy. A 1947 treaty placed it entirely within Yugoslavia.

Note 4. This document contains the earliest date seen for soybeans in Hungary, or the cultivation of soybeans in Hungary (April 1876) (one of two documents). The source of these soybeans was Prof. Friedrich Haberlandt in Vienna.

Note 5. Details on parts I and IV are given in separate 1878 "Document Part" records in this database.

Note 6. This is the earliest document seen that contains the word *Wärmesummen* ("heat units").

Note 7. This book, surprisingly and unfortunately, contains no illustrations.

Note 8. A portrait of Dr. Haberlandt (oil painting) is owned by the University of Mosomagyarovar in Hungary. Soyfoods Center owns a black-and-white photo of the painting.

Note 9. The Vienna World Exposition opened on 1 May 1873 and closed on 1 November 1873. So it lasted for 6 months. Address: Hochschule fuer Bodencultur, Vienna, Austria.

3. Haberlandt, Friedrich. 1878. Erste Abtheilung [Part 1, pages 4-6 (Document part)]. In: F. Haberlandt. 1878. Die Sojabohne [The Soybean]. Vienna: Carl Gerold's Sohn. ii + 119 p. [4 ref. Ger]

• ***Summary:*** Page 4 begins: "Even though the soybean has already found its way to Europe several times, attempts to cultivate it have failed completely because the seeds were from Japan, southern parts of China, and from India. Consequently they were late-ripening seeds. Many years

ago attempts were made to grow *Soja hispida* in Hohenheim [Germany], but the plants were barely brought to a blooming state. People also had the same experience in other places. Dr. A. Rauch of Bamberg [Germany] (see *Die Fundgrube von Dr. A. Rauch. III. Jahrgang. Bamberg* 1876), on several occasions, received seeds of various soybean varieties from Japan from his long-time friend, Colonel *(Oberst)* [Philipp Franz] von Siebold, who died at an early age. But every trial by Dr. Rauch was unsuccessful. The plants came up and some even blossomed, but the blooming happened so late in the year (starting in September) that it was unthinkable that the seeds would ripen fully.

"Mr. Carl Berndt, who owned a silk factory at Hainsberg-Deuben in Saxony was also one of the first to conduct agronomic trials *(Anbauversuche)* with soybeans in Germany. He had no success. He wrote to me about it as follows: 'I had received 8 piculs of those beans [Note: a picul is a Chinese unit of weight = 133.33 pounds] (some green and some yellow), which I obtained through an official order of Governor *(des Minister-Präsidenten)* Dr. Weinlich of Shanghai via our local consul. I sent samples of those all over with the request that the recipient inform me of the results of his agronomic trials. Unfortunately I have waited in vain and I assume that the outcome was as unfavorable as it had been in my case and in my neighborhood. Although some gardeners and I managed to raise a few plants and harvest a few seeds, they rotted after being replanted and therefore could not germinate.'

"One type of soybean that requires warmer weather must have been the one which was introduced to France by M. de Montigny from China. In France it is called oil pea *(pois oléagineux)* and is cultivated at several locations in the districts of Ariège and Haut-Garonne. It is said to have the capacity for rapid growth and resistance to drought*. (Footnote: *Gustav Heuzé: "Les plantes alimentaires." Paris, p. 382, vol. 2).

"During the last German-French war [Franco-Prussian War, 1870-72, France lost], Otto Wehrman, captain in the artillery, found one of those acclimated soybeans in the botanical garden of Montigny near Metz. He liked the plant and took four or five seeds back home. On his estate in Coswig near Meissen he conducted an agronomic trial in 1872 and harvested 80-100 seeds in the fall. He wrote me that in the year 1873 he did the planting sooner, around mid-April, and obtained a fairly decent harvest. In the year 1874 he discontinued the cultivation because he had no use for the harvested beans. Meanwhile, his neighbors became interested in the soybean, so he decided to start growing the plant again in 1875. He harvested 3 liters of seed, which he replanted in April 1876. As a result of the long drought that year, the plants became stunted and the majority of pods had not yet full ripened when early frosts set in and destroyed the crop completely. The quantity of seeds harvested was smaller than that sowed. Its quality was far worse, which caused Wehrman to give up further trials with this variety of soybean.

"Even though the soybean has already spread here and there in the south of Austria, it still hasn't become known in broader circles. Thus, last summer, Dr. E. Mach, director of the agricultural academy *(Lehranstalt)* in South Tyrol [Tirol], sent me a sample of a plant which was supposed to be already long known in that area, and it was none other than a soybean plant. In that area it is called 'coffee bean' *(Kaffeebohne)* and its seeds are used for the preparation a coffee substitute *(Kaffesurrogat)*. Likewise, Mr. Josef Kristan, teacher in a primary school in the Istrian Peninsula *(Capodistria in Istrien)*, reported to me that he had discovered that the soybean could already be found in Istria and its seeds are used as a coffee substitute. A friend of his assured him that there wasn't any difference between these and real coffee. He also received several seeds from Albona [named Labin as of 1988; a commune in western Croatia, on the Istrian Peninsula, 21 miles northeast of Pula], where people grow it from time to time in their gardens without knowing its value. Acquaintances of his stated as well that they had seen the same plant in Dalmatia and in southern Italy. All of the above information only came to my attention after I had been conducting soybean agronomic trials for two years. I had been in correspondence with the authorities mentioned above in order to send them small samples so that agronomic trials could be continued at other locations as well.

"The soybeans which I had used in my first tests in 1875 had been acquired at the Vienna World Exposition in 1873, and were in part from Japan and China, and in part from Mongolia, Transcaucasia, and Tunis [later renamed Tunisia]. There were, in total, no less than 20 varieties *(Sorten)* as follows (table): Five yellow-seeded, three black-seeded, three green-seeded, and two brownish-red-seeded varieties from China. One yellow-seeded and three black-seeded varieties from Japan. One black-seeded variety from Trans-Caucasia. And one green-seeded variety from Tunis.

"During the first year of trial (1875) it had already become apparent that among those were several types that could be recommend for further agronomic trials because they ripened early. Among these were yellow-seeded varieties from both Mongolia and China, and a reddish-brown variety from China. One black variety each from China, Japan, and Transcaucasia ripened poorly. The remaining varieties either didn't bloom at all or only started to bloom in the late fall. Still others developed only a small number of unripe or poorly ripened pods with stunted grains that couldn't germinate."

Note: This is the earliest document seen (March 2004) concerning soybeans in Tunis (Tunisia). This document contains the earliest date seen for soybeans in Tunisia

(1873). The source of these soybeans in unknown. Address: Hochschule fuer Bodencultur, Vienna, Austria.

4. Cook, G.H. 1879. The soja bean; a new forage plant. *Rutgers Scientific School, Annual Report* 15:54-58. [1 ref]
• ***Summary:*** "When in Munich last year, I saw the soja bean in cultivation, as a new crop, and probably a desirable addition to our forage products. It was seen in the grounds of the Bavarian Agricultural Experiment Station, and was in very vigorous growth. The gentleman in charge gave me a few seeds; and seeds of several other varieties of the same plant were procured at Vienna by my friend Mr. James Neilson. We have planted them, and gathered crops of the different kinds this year. The following is a translation of the paper sent out from the Bavarian Experiment Station to those who were growing and testing the capabilities of the plant." Note 1. See: Lehmann, Julius. 1878. *"Ueber den Anbau der rauhhaarigen Sojabohne. Zeitschrift des Landwirthschaftlichen Vereins in Bayern* 68:61-64. Feb.

*"On the Cultivation of the Hairy Soja Bean."–"*The exertions made in the last decade to naturalize foreign useful plants in Germany, and by their cultivation to increase the income from farm lands, have so far been without result. This has been the case with sorghum, ramie, Siberian fodder, water rice, &c., for each of which great hopes have been excited; but nothing now remains but the remembrance and the proof of the difficulties in the way of our agriculture.

"Fortunately the success of this pursuit depends less on such attempts, than on increasing the quantity of our well-known crops, by good cultivation and heavy manuring–by careful selection of seed and proper care of the plant. All farmers taking these precautions, and using discoveries in these directions, will surely gain satisfactory profits even without new plants.

"Yet the progressive farmer will be interested and make personal experiments, of these attempts at acclimating, if the plant promises to fill some want. We now seem to have such a one for our increasing cattle raising. We need a fodder for young cattle, for milk cows and for bullocks, whose seeds contain, in proper amount, albumen and fat, with a pleasant taste. In cereals and their brans, and also in leguminous seeds, we have fodder containing albumen but not fat enough. The addition of oil-cake is not entirely satisfactory, because the proportion of fat in it varies, and its cost is too great.

"Two years ago Prof. Haberlandt, of Vienna, an untiring botanical experimenter, introduced to us a plant whose pleasant-tasting seeds are rich in albumen and fat, in very digestible forms. This plant is the hairy soja bean *(Soja hispida, Mönch.)* Prof. Haberlandt found samples of the seed at the Vienna Exposition among the agricultural products of China, Japan, Mongolia, Transcaucasia and India. He says this plant has been cultivated from early ages. It grows wild in the Malay Archipelago, Java and the East Indies, and is cultivated extensively in China and Japan. Its seeds, boiled or roasted, have a pleasant taste, and form an almost daily part of the food in India, China and Japan. The soja is an annual leguminous plant."

"In 1876, twenty experiments were made in various parts of Bohemia, Moravia [both in the Czech Republic as of Jan. 1993], Southern Austria, Styria [a state in Austria, called Steiermark in German], Hungary, and Upper Silesia [a region mostly in southwest Poland]. From the well-ripened seeds of these crops, one hundred and thirty-five trials were made the next year under various climatic influences. Prof. Haberlandt has written us that only twelve of the experiments failed, and most of the results were unusually good.

"According to Professor Haberlandt there are several varieties of the soja, which vary much in their time of ripening. For the climate of Middle Europe the early kind is best. Sown early in May the seeds mature at the end of September or October. Its time of growth is like that of the horse bean. (This is the *Vicia faba*, the horse bean or Windsor bean of Europe, which is cultivated there for feeding domestic animals, and, like it, ripens after harvest.) It differs from this bean in its productiveness and its non-liability to harm from insects. It has harvested from thirty-three to fifty-five bushels of seed, and two and one-third tons of very nutritious straw to the acre."

"Prof. Schwackerhofer of Vienna, has analyzed the original and harvested seed [two crops], and the soja straw, with the following results." A table shows that the original seed contained 30.56% albuminoids and 15.81% fat. The first and second crops contained and average of 34.56% albuminoids and 18.32% fat–both much higher. The soja straw contained 4.43% albuminoids and 2.51% fat.

A second table (p. 58) compares the composition and comparative value per 100 pounds of 12 feed and fodder crops. Soja beans were found to contain 4.8% ash, 34.7% albuminoids (second highest value after cotton-seed cake (decorticated)), 18.3% fat (the highest), 28.3% carbohydrates, and a comparative value of 2.55 (the highest, with clover hay taken as 1.0).

"In this table the soja bean is shown to have the highest value of any of the substances named, and by mixing it with oat straw or cured corn-fodder, it will make a rich and healthful fodder for cattle, and one which can be afforded in greater quantity and at less expense than first quality timothy or clover hay. It would form, too, a proper crop to be in the rotation between corn and wheat, instead of oats or potatoes, as now practiced. It is not subject to the same difficulties in curing as our common field bean, as the beans do not easily shell out, and coarser stalks enable it to be cured [to make hay] like Indian corn. And being a sowed crop, it is cultivated with the minimum of labor."

Note 2. Prof. George Hammell Cook was instrumental in establishing the New Jersey State Board of Agriculture at Rutgers on 7 April 1872; he was appointed its first secretary. Rutgers thus become one of the early state institutions that conducted agricultural research. On 10 March 1880 the New Jersey Agricultural Experiment Station was established at Rutgers College (New Brunswick)–with state funding only (no federal aid). On 2 March 1887 the Hatch Act created state agricultural experiment stations with federal grants. This is the earliest document seen (Jan. 2005) concerning soybean research by a state research institution or agricultural experiment station.

Note 3. This is the earliest document seen (June 2007) concerning soybeans in New Jersey, or the cultivation of soybeans in New Jersey. This document contains the earliest date seen for soybeans in New Jersey, or the cultivation of soybeans in New Jersey (1879). The source of these soybeans was Bavaria, Germany, and Vienna, Austria.

Note 4. This is the earliest document seen (March 2001) describing cultivation of soybeans by a U.S. land grant institution.

Note 5. This is the earliest document seen (Feb. 2008) that uses the word "albumen" (or "albumens") or the word "albuminoids" (or "albuminoid") in connection with soy. The word "albumen" usually refers to the white / protein of an egg, but here it refers to protein of the soja bean "whose seeds are rich in albumen" (protein). The word "albumin" (first used in 1869) refers to any of numerous simple heat-coagulable, water-soluble proteins that occur in muscle, egg whites, milk, and other animal substances, and in many plant tissues and fluids.

Note 6. This is the earliest English-language document seen (April 2002) that refers to soynuts. Discussing the soybean, it says: "Its seeds, boiled or roasted, have a pleasant taste, and form an almost daily part of the food in India, China and Japan." It is also the earliest document seen (March 2001) concerning the etymology of soynuts.

Note 7. This is the earliest document seen (April 2001) that uses the term "hairy soja bean" to refer to the soybean.

Note 8. This is the earliest English-language document seen (Sept. 2006) with the word "soja bean" (or "soja beans") in the title.

Note 9. This is the earliest English-language document seen (Jan. 2002) related to soybeans that uses the word "forage" in the title.

Note 10. This is the earliest document seen (March 1999) that mentions Mr. James Neilson who, in 1878, obtained several soybean varieties in Vienna, Austria, brought them back to the United States, and planted them at Rutgers University in New Brunswick, New Jersey, in 1879.

Note 11. This is the earliest document seen (May 2000) that uses the word "rotation" or discusses crop rotation in connection with soybeans.

Note 12. This is the earliest English-language document seen (Sept. 2001) that mentions the word "carbohydrates" in connection with soybeans.

Note 13. This is the earliest annual report seen (Oct. 2001) that mentions soy.

Note 14. This is the earliest document seen (July 2002) that mentions feeding soybean fodder to milk cows, however none has yet been fed.

Note 15. This is the earliest document seen (Nov. 2005) that mentions cotton-seed cake (any spelling). It is also the earliest English-language document seen (Nov. 2005) that contains the term "cotton-seed cake" or "decorticated" in connection with such cake or meal.

Note 16. This is the earliest English-language document seen (Oct. 2004) that uses the word "cured" in connection with making soybean hay. Address: New Brunswick, New Jersey.

5. Organov, N. 1881. Soia ili maslichnyi gorokh (Soja hispida *) [Soybean or oil-bearing plant (Soja hispida *)]. *Trudy Imperatorskago Vol'nago Ekonomicheskago Obshchestva, St. Petersburg (Transactions of the Imperial Free Economic Society)* 1(2):184-198. Feb. [3 ref. Rus]
• ***Summary:*** The asterisk in the title refers to a footnote (p. 184) which states: Some call this plant "Chinese beans"; in Austria they call them "Haberlandt's beans." Haberlandt is responsible for the successful cultivation of such useful soybeans in Germany. Thanks to Haberlandt, soybeans also became known in Russia. In 1877, Haberlandt sent about 50 soybeans to I.G. Podoba; from these soybeans we have already (1881) obtained 15 pounds of soybeans. This article is based on a brochure by Haberlandt [his superb book, *Die Sojabohne,* 1878], plus the scarce information from the Russian agricultural literature.

The origin of the soybean is in Asia (India, China, Japan, Mongolia). Large quantities of numerous varieties are cultivated there. Soybeans are also grown in the Caucasus, Tunisia, and Algeria, as well as in southern and central Europe. Many attempts have been made to cultivate soybeans in Europe, but more were unsuccessful. Attempts were made in: Hohenheim [Germany]–unsuccessful. Bamberg [southern Germany], by Dr. A. Rauch, who obtained the seeds from their native country–unsuccessful. Germany, by Carl Berndt, using seeds from Shanghai–unsuccessful. France, where soybeans are more commonly known as *pois oleagineux.* 1872–During the Franco-Prussian War [1870-1872, France lost], Sergeant Otto Wehrman found soybeans in the botanical garden of Montigny near Metz and brought them to Germany, where in 1875 attempts to cultivate them were again made.

In 1877 Prof. Haberlandt (Austria) cultivated soybeans received from Capodistria in Istrien [Istria or Istrian Peninsula; as of 2003 divided between Croatia and, at its base, Slovenia]. In Istria, soybeans were used to make

coffee. They were also cultivated in Dalmatia [as of 2003 largely in Croatia] and southern Italy.

Such methods of cultivation resembled experimental gardening of horticultural and hothouse plants rather than scientific research on the acclimatization and growing capabilities of soybean plants.

The soybean plant has been well known and well documented by botanists and travelers since the last [18th] century. Kaempfer called the soybean *Daidzu* or *Mame.* Linnaeus called it *Glycine soja.* Jacquin–*Dolichos soja.* Dr. von Siebold and Zuccarini *Soja Japonica,* Sav. and *Soja hispida,* Mönch. Each name represents a different variety of soybeans [sic].

A footnote (p. 181) states: The famous essay by Kaempfer, titled *Amoenitatum exoticarum politico-physico-medicarum,* describes his travels in Persia and Central Asia in 1712. The essay includes descriptions and uses of soybeans in Japan, China, India, and other places.

Knowledge of and interest in soybeans in Europe expanded during and after the 1873 Vienna World Exhibition. Twenty varieties of soybeans were obtained by Haberlandt, who planted them in 1875 in the Vienna Botanical Garden.

A description of Haberlandt's studies (p. 186) includes favorable growing conditions, a description of planting, and identification of different soybean varieties. In 1876, there were only 7 interested people or organizations who wanted to continue Haberlandt's research on soybean cultivation. However by 1877 Haberlandt's successful results interested more people (up to 160). These people received samples of soybeans from Haberlandt and reported their results back to him. Footnote (p. 187): The results of Haberlandt's experiments and those of the colleagues to whom he sent samples were published in the 1878 brochure [sic, book] *Die Sojabohne: Ergebnisse der...*

Describes the physical appearance of soybeans.

Page 188 proposes uses for the soybean in Europe, as food for people, feed for livestock, soybean oil, coffee, and soy sauce. Quotations from Oken (p. 189-90) discuss various uses of soybeans, including a description Miso (a substitute for butter) and Shoyu (a sauce added to fried meat), and how each is made. In China, soybeans are used to prepare a soft cheese or cottage cheese (tofu). A footnote (p. 188) is a reference to a book: Oken. 1841. *Allgemeine Naturgeschichte für aller Staende.* Vol. 3, p. 1661. Page 190 continues with comments on the great nutritional value of soybeans when used as food. A quotation from Dr. F. Leithner [of Krems, lower Austria, on the Danube River, 38 miles west-northwest of Vienna] describes his positive experiences in preparing soybeans as dinner for his guests. Prof. W. Hecke recommended that soybeans be combined with potatoes to make a kind of porridge. A quotation from Dr. Eduard Mach [of St. Michele, South Tirol] describes the taste of soybeans. Other food uses of soybeans proposed by Haberlandt: a substitute for peas in pea sausages, chocolate substitute.

Three tables (p. 191) show the nutritional value / chemical composition of soybeans. (1) The first analysis of the composition of soybeans (soybean seeds) in Germany was conducted by Senff, who obtained the seeds from Japan [from Mr. Berndt]. Their average chemical composition is given. (2) Mr. A. Tomaszek / Tomasek [in Napagedl in Mähren / Moravia, a region in today's Czech Republic] gives the following composition percentages for two types of soybeans from China, grown by him in 1876: yellow (column 1) and dark red (col. 2). (3) Further analysis by Tomaszek / Tomasek shows extremely high concentrations of fat and nitrogen [protein] for the two types of soybeans shown in table (2).

Three more tables (p. 192) give a more detailed analysis, by the Technical Laboratory in Vienna, of three soybean varieties: yellow (from Mongolia), yellow (from China), and dark red (from China). There are three columns: Original soybean sample, soybeans grown the first year, and soybeans grown the second year. For each variety, data are given for water, protein, fat, nitrogen-free extract, crude fiber, and ash.

A table (top of p. 193) shows the chemical composition of seven types of legumes: Peas, lentils, wild beans, yellow lupins, haricot beans, broad beans [Vicia faba], Chinese beans (soya), and soya beans. For each legume, data are given for water, protein, fat, nitrogen-free extract, crude fiber, and ash. The data for the first five legumes come from Emil T. Wolff. The data for the broad beans and Chinese beans (soya) come from J. Kuehn / Kühn. The data for the soya beans come from Zulkowski.

A quotation from Carl Berdt includes details on soybean composition, and discussion of the uses of soybean oil (including in bread). A table (p. 193-94), based on the research of Prof. Völker [Voelcker, of London] gives the percentage composition of dried soybean oil-cake (Chinese oilbean cake). A table (2 columns) by Caplan (p. 194) gives the chemical composition of soybean pods, and of the leaves and stems. Another table (p. 194-95) gives an analysis by Zulkowski of the composition soybean straw and chaff dried at two temperatures: air-dried, and dried at 100ºC. A table (p. 196) shows the mineral composition of soybeans.

Pages 197-98 summarize: (1) Cultural trials and harvest information by Attems with Mongolian yellow and Chinese brownish-red soybeans. He was satisfied with the results and sees a future for soybeans. (2) Harvest results of Tomaszek. (3) Harvest results of Prof. Kulisz. Continued.

Note 1. This is the second earliest Russian-language document seen (Nov. 2002) concerning the soybean.

Note 2. This is the earliest Russian-language document seen (Sept. 2006) that mentions soy oil.

Alternate Journal Name entry: Trudy Vol'nogo-Ekonomicheskogo Obshchestva (Scholarly Works of the Free Economical Society).

6. *Rural New-Yorker.*1882. Notes from the experimental grounds of the Rural New-Yorker [The Hairy Soja Bean]. 41:9-10. Jan. 7.
• ***Summary:*** A large, excellent illustration (line drawing, by W. Scranton of the *Rural New Yorker)* shows three leaves, several clumps of pods, 3 seeds, and the upper stems of soja bean plant.

"The Hairy Soja Bean ["Hairy" is based on the German term "rauhaarigen"], of which an original sketch is now presented,... was first brought to our notice by Professor Geo. H. Cook of the Rutgers Scientific School of New Brunswick, New Jersey... he says that when in Munich in 1878, he saw the Soja Bean in cultivation as a new crop, and probably a desirable addition to our forage products. It was seen in the grounds of the Bavarian Agricultural Experiment Station, and was in very vigorous growth. The gentleman in charge gave him a few seeds; and seeds of several other varieties of the same plant were procured at Vienna by Mr. James Neilson. Both planted them and gathered crops of the different kinds in 1879. The following is a translation of a part of a paper sent out from the Bavarian Experiment Station to those who were growing and testing the capabilities of the new plant: "Two years ago Professor Haberland [Haberlandt], of Vienna, an untiring botanical experimenter, introduced to us a plant whose pleasant-tasting seeds are rich in albumen and fat in very digestible forms. This plant is the Hairy Soja Bean (Soja hispida, Moench). Professor Haberland found samples of the seed at the Vienna Exposition among the agricultural products of China, Japan, Mongolia, Transcaucasia and India... Its seeds, boiled or roasted, have a pleasant taste, and form an almost daily part of the food in India, China and Japan."

Experiments were made in various parts of Bohemia, Moravia [both in the Czech Republic as of Jan. 1993], Southern Austria, Styria [the capital of Graf in today's Austria], Hungary and Upper Silesia in 1876. The next year 135 trials were made under various climatic influences from the well-ripened seeds from these crops. Professor Schwackerhofer, of Vienna, has analyzed the original and the harvested seed, and the Soja straw.

The article then summarizes two articles on soybeans, one from *La Nature* in France (July 1881) and another from *Gardener's Chronicle* in London (18 Sept. 1880).

"Seeds of the Soja Bean were sent to us by Mr. James H. Gregory [seedsman] of Marblehead, Massachusetts, at our request, last winter." The Rural New-Yorker grew them, and concluded: "While the leaves and stems were quite green our cattle eat them with evident relish but the relish was less apparent as they ripened–and they were refused entirely after being cut and dried. From the above test we should never raise the Soja Bean as a fodder plant. Many kinds of the cow-pea, as may be seen from our reports in these columns during 1880, will yield five times the amount of vine and leaves."

7. *Foreign Seeds and Plants Imported by the Section of Seed and Plant Introduction, USDA, Inventory.*1898. Serial/ periodical. U.S. Department of Agriculture, Division of Botany. Inventory No. 1, S.P.I. Numbers 1-1000, is 81 p.
• ***Summary:*** This serial publication, begun by O.F. Cook, is the single best source of information on early soybean introductions to the USA. A number was assigned to each new seed or plant introduced. The earliest Seed and Plant Inventory numbers for "Glycine hispida–Soja bean" are #480 (received March 1898 through Prof. N.E. Hansen, from South Ussurie, Siberia) and #647-56 (received March 4, 1898, through Hon. A.E. Buck, from Tokyo, Japan).

The Introductory Statement in Inventory No. 1, written by O.F. Cook (Special Agent in Charge of Seed and Plant Introduction) states: "When the work of this section [of Seed and Plant Introduction] was formally organized the Department was already in the possession of a considerable quantity of seeds [not including soja beans] secured by Prof. Niels Ebbesen Hansen of the Agricultural College of South Dakota during a visit to Russia, central Asia, and Siberia." The first seeds from Prof. Hansen, cabbage seeds, were received in Feb. 1898. "More recently there has arrived from France a large series of seeds [not including soja beans] and cuttings personally selected by Mr. Walter T. Swingle, agricultural explorer of this section."

"The organization, methods, and purposes of this section have been recently explained in a bulletin and a circular, which are available on application. It should be repeated here that our efforts are on a line quite distinct from that of the Congressional seed distribution, whose object is the general and popular distribution of vegetable, field, and flower seeds."

No starting date is given in Issue No. 1. The transmittal date of No. 2 is 5 July 1899. The final year for this serial is not clear. In 1902 this publication ceased and the inventory was continued in the USDA Bureau of Plant Industry, Bulletins No. 5 (issued 18 Jan. 1902), No. 66 (8 Feb. 1905), No. 97 (15 March 1907), No. 106 (20 Dec. 1907), etc. co

Ted Hymowitz notes that most of these early soybean varieties have been lost (Pers. comm. 27 May 1989). We can find no explanation in the early issues of what the abbreviation "S.P.I." means.

8. Wuchino, A.E. 1901. Soia [Soya: As one of the best food and feed products from the plant world]. Tiflis (Tblisi), Republic of Georgia: K.P. Kozlovski (Ave. Golovin, No. 12). 45 p. 26 cm. [Rus]

• ***Summary:*** Page 12 states: The information about growing soybeans in Transcaucasia is very poor, but the first planting was done in the 1870s. G. Sturua obtained some varieties of soybeans from Tokyo, Japan, via his brother. He gave some of these seeds to the Tblisi Botanical Garden [in Georgia]. In 1898 at the agricultural school in Kutaisi, they conducted a good soybean trial.

Note 1. This is the earliest document seen (April 2008) concerning soybeans in the Republic of Georgia, or the cultivation of soybeans in Georgia. This document contains the earliest date seen for soybeans in Georgia, or the cultivation of soybeans in Georgia (1898 in Kutaisi). The source of these soybeans is unknown, but they may have come from Japan. It is not clear whether or not the soybean seeds were cultivated at the Tblisi Botanical Garden. They probably were, but we cannot be certain.

Note 4. This is the 2nd earliest document seen (May 2008) concerning soybeans in Central Asia (Transcaucasia), or the cultivation of soybeans in Transcaucasia. This document contains the 2nd earliest date seen for soybeans in Central Asia or the cultivation of soybeans in Central Asia (1870s). The source of these soybeans is unknown.

Note 4. Kutaisi (or Kutais) is a city in western Georgia on both banks of the Rioni River about 65 miles (105 km) northeast of Batumi.

Note 5. This is the earliest document seen (May 2008) that mentions G. Sturua. How can we learn more about his life and work with soybeans? For more details, see Tupikova 1930. Address: Georgia.

9. Meyer, Frank Nicholas. 1902. Letters of Frank N. Meyer. 4 vols. Compiled by USDA Bureau of Plant Industry. 2444 [i.e. 2577] leaves. Unpublished typescript.
• ***Summary:*** Only two copies of these rare, magnificent unpublished documents exist. One is Rolls 28-30, Vols. 105-109, Project Studies, Division of Plant Exploration and Introduction, Record Group 54: Records of the Bureau of Plant Industry, The National Archives. The second is at the University of California at Davis. Most are carbon copies of typewritten letters. Includes some illustrations (pencil sketches) by Meyer.

The first letter in this collection, dated 7th Oct. 1902, is from Meyer in Santa Ana, California, to Mr. Adrian J. Pieters (a fellow Dutchman) at USDA in Washington, DC. Meyer arrived in California on 18 Sept. 1902 and started immediately to work for USDA at the plant introduction garden in Santa Ana; he stayed 7 months. In April 1904 Meyer is in Guadalajara, Mexico. In March 1905, Meyer receives an offer from David Fairchild and Pieters to work for USDA as an agricultural explorer in northern China. In August 1905, he is in Nagasaki, Japan. In Sept., he is in Shanghai, China. In Oct. 1905, he writes a long letter to Fairchild. Meyer made four very fruitful expeditions to Asia, eastern Europe, and the Middle East. His first expedition was to China, Manchuria, and Siberia, 1905-08. His second was to Europe, Russia, Caucasus, Transcaucasia, Turkestan, and Siberia, 1909-12. His third was Russia, Siberia, Manchuria, China, and Japan, 1912-15. And his fourth and final expedition was to Japan and China, 1916-18.

On 23 Dec. 1917, war engulfed Frank Meyer at Ichang (I-ch'ang or Yichang) on the Yangtze River. He was trapped there until 2 May 1918 when he managed to break through lines of soldiers. The last letter in this collection, dated 18 May 1918, is from Meyer to Fairchild written from Hankow, China. He died about 1-2 June 1918, having drowned in the Yangtze River below Anking, and above Wuhu, China.

Meyer did not report any soybeans in Russia or Turkestan.

Note 1. This is the earliest document seen (July 1998) concerning Frank N. Meyer.

Note 2. Ichang, which opened as a treaty port in 1876, was a city of 40,000 people by 1920. It is situated at the head of steam navigation on the Yangtze, at the throat of the main outlet from Szechuan, and at the point where the mountains of Szechuan and western Hupeh meet the central plain of Hupeh.

Note 3. Soyfoods Center owns all pages that mention soy, plus: (1) The full U.C. Davis cataloging record for the archival collection, which is in Special Collections SB108 A7M49 1902 v1-4. (2) A letter from Melissa Tyler of U.C. Davis, dated 22 Sept. 2003, discussing the collection and its lack of front matter. (3) Appendix A: Bureau of Plant Industry, by Knowles Ryerson about a dispute he had with Secretary of Agriculture Henry Wallace involving Nicholas Roerich, Dr. H.G. MacMillan, and James F. Stephens over a plant exploration expedition to Manchuria and the Gobi Desert. In 1934 Ryerson was appointed Chief of the USDA's Bureau of Plant Industry; this dispute led to his removal that same year; he was replaced by Frederick D. Richey. Address: USDA Bureau of Plant Industry.

10. Meyer, Frank N. 1910. Re: Soy coffee. In: Letters of Frank N. Meyer. 4 vols. Compiled by USDA Bureau of Plant Introduction. 2444 p. See p. 949-50 (March 15), p. 1023 (May 27), and p. 1095-96 (Aug. 10).
• ***Summary:*** In a letter (p. 949-50) to David Fairchild of USDA, sent from "Tiflis, Caucasus, Russia," Meyer notes that he is sending "various samples and parcels containing seeds, cuttings and a sample of Soy coffee."

"The third registered sample is a tin of coffee made from the roasted yellow soy bean and it forms a very tasteful and nutritive substitute for the real coffee. It is made by a firm called "Argot" at the Sta. Quirili on the railroad from Batoum [probably Batumi, formerly Batum, a city and seaport on the Black Sea] to Tiflis [Tbilisi or T'bilisi, capital of the Republic of Georgia]. This so-called coffee is in my

opinion better than Postum as sold in America and it may be that there is a future for the soy bean as a beverage producer."

Meyer then comments (p. 1018, 1023, from Baku, Caucasus, Russia) on a letter sent to him by Fairchild after Fairchild had tasted the soy coffee. "Letter of April 15, 1910, in which you tell me that you couldn't find any difference in taste between the ordinary coffee and the sample of soy bean coffee I sent you. I hadn't expected that, but I suppose you used plenty of cream in it and then it tastes wonderfully like coffee which is not too strong; taking it however without any milk, then it is decidedly less aromatically bitter than the produce of Coffea arabica. I have done as you wished and have sent the firm Argot in Quirili a money order for 5 roubles which is 3.60 roubles for 12 tins of coffee at 30 Kopecks per tin, and the remainder covering postal charges. I trust you will receive it a month or so from now."

Later (p. 1095-96; 21 June 1910) Meyer notes that the soy bean coffee company is named "Argo," and located at Kurile, Caucasus. They sent samples to the American Consul at Batoum and asked Meyer for a testimonial which they could print in their literature about this product.

Note 1. Quirili or Kurile (on the Kvirila River) is named Kvirili on a 1916 British map, but a 1958 British map shows that it has been renamed Zestafoni or Zestap'oni. The largest nearby city is Khasur or Khashuri (Kutasis in 1916), which is about 15 miles to the east. Quirili is located on the railroad about half way from Batumi (Bat'umi) to Tiflis (T'blisi). This railroad continues on to Baku, the capital of Azerbaijan, which is a port on the west coast of the Caspian Sea located at the center of one of the largest petroleum-producing regions in the former USSR.

Note 2. This is the earliest document seen (April 2008) concerning soybean products (soy coffee) in the Republic of Georgia; soybeans as such have not yet been reported, yet it seems quite likely that soybeans were cultivated in this area at this time. Note that as early as 1873 Haberlandt obtained soybeans from Transcaucasia.

Note 3. This is the earliest English-language document seen (March 2001) that uses the term "soy bean coffee" to refer to soy coffee.

Location: University of California at Davis, Special Collections SB108 A7M49. Address: USDA Plant Explorer.

11. **Product Name:** [Soy coffee].
Manufacturer's Name: Argot or Argo.
Manufacturer's Address: Sta. Quirili (Kurile), on the railroad from Batoum to Tiflis, Republic of Georgia, Russia.
Date of Introduction: 1910. March.
New Product–Documentation: Letter from Frank N. Meyer to David Fairchild of the USDA. In: Letters of Frank N. Meyer. 4 vols. Compiled by USDA Bureau of Plant Introduction. See p. 949-50, 1023. March 15. It is made by a firm called "Argot" at the Sta. Quirili on the railroad from Batoum [probably Batumi, formerly Batum, a city and seaport on the Black Sea] to Tiflis [Tbilisi or T'bilisi, capital of the Republic of Georgia]. On page 1095 (10 Aug. 1910) Meyer says that the soy bean coffee company is named "Argo," and is located at Kurile [perhaps Quirili], Caucasus. So the product is probably made in the Republic of Georgia.

Note 1. This is the earliest known commercial soy product made in the Republic of Georgia. Yet Georgia had been a vassal of Russia since 1783. So this is also the earliest known commercial soy product made in the Russian Empire.

Note 2. The Quirili is a river (a great tributary of the Rion) near Tiflis, in Georgia, Transcaucasia (See: Freshfield, Douglas W. 1869. *Travels in the Central Caucasus and Bashan...*, p. 91-92).

12. Timofeev, S.N. 1910. Soya, ee kul'tura i prum'nenie: V' zapadnom' Zakavkaz'e [Soya–Its cultivation and utilization: In the west Caucasus]. Saint Petersburg, Russia: Tipografiya "Sel'skago Vestnika." 16 p. [Rus]
• ***Summary:*** The "west Caucasus" in the title refers to Transcaucasia, mainly the Republic of Georgia. Page 7 states that in the West Transcaucasus soya first appeared in the 1870s. With the accordance of the Kutaisi Experimental Station, in 1902 they had 4 soybean varieties. Address: Agronomist, Russia.

13. Heingartner, Alexander. 1911. Soya-bean culture in the Caucasus. *Daily Consular and Trade Reports (U.S. Bureau of Manufactures, Department of Commerce and Labor).* 14(97):393. April 26.
• ***Summary:*** "The first crop of soya beans grown in the Caucasus has been sold to Hamburg. The amount to be shipped is 500 tons, and the price at Batum [Batumi] is 1.10 rubles per pood, or $35.12 per metric ton. Freight to Hamburg is 13*s.* ($3.16) per ton.

"At this price the cultivation of the soya bean is very remunerative to the farmers, and it is estimated that this year's crop for export, judging by the quantity of seed beans retained for planting, will amount to 16,000 tons.

"For full steamer shipments to England and Germany the freight would be about 10*s.* ($2.43) per ton, against $7.05 from Dalny, Manchuria. This difference in freight charges and the quicker delivery to Continental ports will give to growers in the Caucasus a great advantage.

"If the present demand continues, it is expected that in a very few years the production of soya beans in the Caucasus will assume very large proportions."

Note 1. Batum [now Batumi, Bat'umi] is a seaside city, large port and commercial center at the east end of the Black Sea, 4 miles north of the mouth of the Choruk River. Long the possession of Persia and Turkey (it was the last Turkish port on the Black Sea), it was acquired by Russia in

1878, then occupied by the British in 1918. As of 2008 it is the capital of the Autonomous Republic of Adjara in the southwest Georgian S.S.R. Batumi lies at the northern periphery of a humid subtropical zone, and has the highest rainfall in both Georgia and the entire Caucasus region. The nearest point in the nearest neighboring country, Turkey, is only about 12 miles away, to the southwest.

Note 2. This is the 2nd earliest document seen (Feb. 2008) concerning or the cultivation of soybeans in the Republic of Georgia. This document contains the 2nd earliest date seen for soybeans in the Republic of Georgia, or the cultivation of soybeans in the Republic of Georgia (1911). The source of these soybeans is unknown. Yet just because these soybeans were sold at Batumi in Georgia, we cannot be sure that they were actually grown in Georgia, though we are told that they were grown in the Caucasus, which does not include Turkey.

Note 3. This is the 3rd earliest document seen (May 2008) concerning the cultivation of soybeans in Central Asia (Republic of Georgia). Address: Consul, Batum [Batumi, Bat'umi], Russia.

14. *Matieres Grasses (Les) (Paris).*1911. La culture du soja au Caucase [Soybean cultivation in the Caucasus]. 4(38):2306. June 25. [Fre]
• ***Summary:*** This is a French language translation of the following English language document: Heingartner, Alexander. 1911. "Soya-bean culture in the Caucasus." *Daily Consular and Trade Reports* (U.S. Bureau of Manufactures, Department of Commerce and Labor). 14(97):393. April 26.

15. *USDA Bureau of Plant Industry, Inventory.*1912. Seeds and plants imported during the period from July 1 to September 30, 1911. Nos. 31371 to 31938. No. 28. 71 p. Sept. 10.
• ***Summary:*** Soy bean introductions: *Glycine hispida:*
"31548-31552. From India. Presented by Mr. E.J. Woodhouse, Department of Agriculture, Sabour, Bengal, India. Received July 26, 1911. Seeds of the following.

"31548. Chocolate variety.

"31549. Greenish yellow.

"31550. Black.

"31551. *Nepali.*

"31552. Yellow."

"31780/31832. Received through Mr. Frank N. Meyer, agricultural explorer, September 11, 1911. Seeds of the following:

"31802-31804.

"31802. From Karghalik [Yecheng or Yeh-ch'eng], Chinese Turkestan [in far western China]. '(No. 1494a, December 12, 1910.) A large, green variety of soybean called *Ching tou,* used when slightly salted and roasted as an appetizer before meals. To be tested like No. 1491a (S.P.I. No. 31799).' *(Meyer).*

"31803. From Kashgar [Kashi], Chinese Turkestan. '(No. 1495a, October 23, 1910.) A black soy bean, used like No. 1494a (S.P.I. No. 31802) and also used to make bean curd. To be tried like No. 1491a (S.P.I. No. 31799).' *(Meyer).*

"31804. From Karghalik, Chinese Turkestan. '(No. 1496a, December 12, 1910.) A large, black soy bean called *Ghae tou.* Used like No. 1494a (S.P.I. No. 31802).' *(Meyer.)"*

Note: This is the earliest document seen (April 2008) concerning soybeans in Turkestan, or the cultivation of soybeans in Turkestan (including Chinese Turkestan, which was actually called Sinkiang at this time). This document contains the earliest date seen for soybeans in Chinese Turkestan, or the cultivation of soybeans in Chinese Turkestan (1912). The source of these soybeans is unknown. Address: Washington, DC.

16. Fruwirth, C. 1915. Die Sojabohne [Soybeans]. *Fuehlings Landwirtschaftliche Zeitung* 64(3/4):65-96. Feb. 1 and 15. [65 ref. Ger]
• ***Summary:*** Contents: Introduction (work in East Asia and Europe from 1905-10). History. Botanical aspects. Varieties. Breeding. Needs of the plant (incl. "heat units, *Wärmesumme).* Utilization (incl. in German *Tofu, Miso, Chiang, Schoyu* or *Sojatunke* (shoyu, p. 83), *Natto, vegetabilische Milch* (soymilk), soy sprouts). Measures and precautions in cultivating soybeans (incl. yields). The soybean as a crop in central Europe. Conclusion.

Note: On p. 83 the term "Sojas" is used to refer to soybeans, and "Sojatunke" to refer to soy sauce.

In 1905 the Japanese made the first attempt to import soybeans from Manchuria to Europe, but it failed because they did not arrive in good condition. The repetition of the attempt in 1908, however, gave good results. Then imports of soybeans grew, followed by imports of soybean cake *(Sojabohnenkuchen).* Major importers today are England, France, Germany, Denmark, Italy, Belgium, Netherlands, Sweden. The high import duty hinders imports to Austria-Hungary.

Toward the end of the 1800s in Russia, Owinsky took early-ripening soybean varieties from China and Japan and requested the expansion of soybean cultivation. In 1899 in Kiev, Owinsky wrote the name of the soybean as Soja hispida praecox (p. 67). Owinsky in Derajne [Derazhne?] grew Podolie soybeans (p. 77). Sempolowsky in Derebzin, Russian Poland, also grew soybeans. European Russia gets soybeans overland (probably from Manchuria). Russia was one of the first countries to take an interest in growing soybeans after 1908. Russia now grows large amounts of soybeans in Podolia. In Germany, Prof. Kallo in Wiesbaden was a pioneer who recommended soybeans as an

inexpensive food for the people. North America first started to import lots of soybeans as a source of oil because of a bad cottonseed harvest.

"Since the start of my teaching activities, I have had an interest in the soybean plant and have carried on my own investigations." In 1900 the author received 7 soybean varieties from L.V. Jurdiewicz from Deraznia in Podolia; these had been imported by Owinsky. In 1901 at Hohenheim he began to study the time needed for soybeans to mature; He found it ranged from 141 to 163 days. He continued this research at Hohenheim from 1901 to 1903, getting soybean seed yields of up to 1,560 kg/ha. From 1910 to 1914 he continued at Waldhof-Amstetten, with 5 varieties. The maturity range there was 112-166 days and the yields were up to 1,500 kg/ha (about 23 bushels/acre), but the yields of many varieties were low, about 300 to 500 kg/ha (4.5 to 7.5 bu/acre). Yields of soybean straw, however, were up to 3,600 kg/ha. Fruwirth uses three terms to refer to soybeans: (1) Die Sojabohne; (2) Die Soja; and (3) Sojas, as "Zuechtung von Sojas" or "Sojas, meist gemahlte." There are now a proposal to establish a joint stock company for growing soybeans in central Europe (probably in Germany), using big money. But it may not succeed because soybean yields in Germany and Austria are low. Seedsmen who sell soybeans commercially in 1915 include: Haage and Schmidt (Erfurt, Germany), Vilmorin Andrieux (Paris, France), Dammann & Co. (St. Giovanni at Tedaccio, near Naples, Italy), and Wood and Son (Richmond, Virginia, USA). The main soybean varieties sold by each of these companies are described in detail (p. 73-74).

Utilization (p. 82): Since soybeans are rich in protein and fat, they can be used as a good meat substitute. In Europe the use of soybeans for food is still very small. "In Europe, the first foods from soybeans were made in France, at Vallées near Asnieres: Flour, bread, and cakes for diabetics, and cheese. In Germany not long ago the Soyama-Works at Frankfurt am Main likewise began the production of such foods. Similar foods were also made in Romania. Soybeans sprouted in the dark yield a bitter-tasting salad. Production of vegetable milk started in France at 'Caséo Sojaine' at Vallées (Seine); and is now being studied by the Synthetic Milk Syndicate in England. Using the process developed by Fritz Goessel, this Syndicate made 100 liters of soymilk from 10 kg of ground soybeans at a factory at Liverpool." "It is in no way certain that soybeans will ever be widely used in human foods."

A fairly large amount of soybeans are ground for use as fodder. The main use is for oil extraction. Yet Haberlandt considered that since the soybean contained only about 18% fat (range: 13-22%), its use as a source of oil would not be economical. The main use of soy oil is in soaps, for which it is highly prized. It is also used in making paints as a partial substitute for linseed oil. The best quality may be used as food. In England soy oil is used for margarine production.

Conclusion: The soybean originated in central Asia and is now widely cultivated in China, Japan, Manchuria, and India. Its seeds are rich in protein and, unlike most other legumes, also rich in fat. The plant is used in its homeland mostly as a source of human foods and seasonings, made by fermentation; the oil is used mostly for industrial non-food purposes. In recent years soybean production has expanded significantly in the southern part of the United States. There it is used mainly as green fodder, hay, silage, and soil building. The main expansion of soybean cultivation in Europe has been in Italy, southern France, Hungary, and southern Russia. Good early varieties give yields of 1,100 to 1,300 kg/ha. A large expansion of soybean production in central Europe is possible only in southern Austria and Hungary, and maybe in a few other places where it is warm. But late-maturing soybeans may be grown for forage and silage in the cooler parts of Germany and Austria. Address: Prof., Dr., Wien (Vienna).

17. Siemashko, V. 1915. Materialy k mikologicheskoi flore Sukhumskago okruga [Contribution to the mycological flora of the district of Suchum (Russia)]. *Materiali po Mikologii i Fitopatologii Rossii (Data on Mycology and Phytopathology in Russia)* 1(3):23-41. Sept. [Rus; rus]
• ***Summary:*** A list of 217 species of fungi (with 17 illustrations) collected during the autumn of 1913 and during 1914 in the district of Suchum [Sukhum] and other parts of Transcaucasia along the coasts of the Black Sea.

They found a number of species which were new to science, including No. 31, *Mycosphaerella phaseolorum* Siemaszko (Fig. 3), a Pyrenomycete which, occurring on the leaves of *Glycine soja, Phaseolus mungo,* and *Vigna rubia,* forms whitish spots with a darker border; this fungus is very similar to *Mycosphaerella phaseolicola* (Desm.) Sacc. from which, however, it differs in shape and in the dimensions of the spores.

No. 103, *Phyllosticta sojaecola* Mass., was also found on *Glycine soja.*

Note 1. As of Oct. 1999 Suchum is called Sukhumi (formerly Sukhum). It is the capital city of the Abkhaz Republic within the Republic of Georgia. During the early 1990s it was the center of Abkhazian rebellion. It was occupied by Georgian troops until it fell to rebel forces in Sept. 1993.

Note 2. *Glycine soja* is the wild soybean. Address: Biuro po Mikologii i Fitopatologii Ucenago Comiteta Zemleustroistva i Zemledielia (Bureau of Mycology and Phytopathology).

18. Hall, William H. ed. 1918. Reconstruction in Turkey: A series of reports compiled for The American Committee of

Armenian and Syrian Relief. New York, NY: ACASR. 243 p. No index. [25* ref]

• ***Summary:*** In the chapter on "Agriculture," the section titled "Agriculture in Asia Minor" begins (p. 134): "Asia Minor, or Anatolia as it is called locally, with European Turkey on the west and Armenia on the east is the heart of the Turkish Empire."

The subsection on "Products" states (p. 136): "Two other characteristics of the vegetation deserve especial notice... The other exceedingly interesting fact is the prevalence of legumes of various sorts which inoculate the soil with their bacteria and invite the cultivation of legumes for agricultural purposes including alfalfa. White calico beans are raised in quantity, so also horse beans. There are peas of several varieties including chick peas, inviting the use of cow peas and soy beans in crop rotation and as soil builders."

At bottom of title page: "For private distribution only."

Note: This is the earliest document seen (May 2008) concerning soybeans in connection with (but not yet in) Turkey. Address: ACASR, 1 Madison Ave., New York City.

19. Fairchild, David. 1919. A hunter of plants. *National Geographic Magazine* 36(1):57-77. July.

• ***Summary:*** The story of the life and work of Frank N. Meyer, USDA agricultural explorer, including descriptions of his four expeditions. He drowned on 2 June 1918 in the muddy waters of the Yangtze River. "His first expedition in the years 1905-1908 was into North China, Manchuria, and northern Korea; his second, in 1909-1911, through the Caucasus, Russian Turkestan, Chinese Turkestan, and Siberia; his third, in 1912-15, through northwestern China into the Kansu Province to the borders of Tibet, and his last expedition in search of plants began in 1916..."

Photos show: (1) A "courtyard filled with jars in which a mixture of soy-beans, wheat, and salt is fermenting to make soy sauce. The mixture is protected from the sun and rain by cleverly woven hoods of split bamboo. Mr. Meyer made a careful study of this great soy-bean sauce industry and introduced a large number of varieties of the bean" (p. 66). (2) Frank N. Meyer with a branch of jujube in his hand. He first saw orchards of this new fruit in China in 1906 (p. 76). Address: Agricultural Explorer, in Charge of Office of Foreign Seed and Plant Introduction, USDA.

20. Wing Seed Co. 1920? The Wing Seed Co. The soul of a business: Has the Wing Seed Company earned a right to existence (Leaflet). Mechanicsburg, Ohio. 2 p. Undated. Front and back. 30 cm.

• ***Summary:*** The front of this undated leaflet is divided vertically into halves. On the right half the company explains that it is reluctantly offering $200,000 of 7% cumulative preferred stock. "Since the great war began you have learned much about investments." And "last year we doubled the entire business without any increased expenditure for advertising. Our profit could not possibly be large enough to keep up with this rate of growth; hence it becomes necessary for us to issue this small block of stock." On the left half of the page are recommendations from prominent Ohioans.

On the back is a full-page history of the company, which has existed primarily to serve farmers. "Thirty years ago Joseph E. Wing, while seeking more robust health in the Rocky Mountains, sent home a little alfalfa seed to be tested on the home farms." That was the beginning of the growth of Alfalfa east of the Missouri River. "Twenty years ago it became necessary for the Wing Brothers to handle Alfalfa seed because the farmers demanded that they should do so." The company spent many pages of its seed catalog teaching farmers how to grow new crops. It also guaranteed its seed to be free of adulteration and dodder. "Then the company put in trial grounds while the bankers looked on with disapproval." They tested all varieties carefully. "On account of this experimental work they have at all times been in the lead of their competitors, and sometimes even in the lead of the Experiment Stations. They tested out Soy Beans, growing them in a practical manner on their farms, and using them for seed in various ways... Then they brought out a few absolutely new varieties of Soy Beans of their own, and at least one of these is superior to anything else in its line that has been brought out by any other source... Through selection they added fifty per cent to the yield of one variety of Soy Beans."

In 1917, when the United States "faced the most serious shortage of Seed Corn ever seen, The Wing Seed Co. had more good seed than all the other seed firms put together." One year the American market was flooded with low-price Turkestan alfalfa–which proved to be almost worthless.

Note 1. Letter from Sherry Vance of the Bailey Hortorium at Cornell University. 1999. March 10. This undated document was probably published in 1920 or 1921. It is "filed in the box after the regular 1920 catalog and before the 1921 price list. Assume from that what you will. I do believe Miss Bailey was conscientious about filing materials. The document is a single sheet of paper printed on both sides. It is folded in half like a flyer or small pamphlet. Folded, the dimensions are 6 inches wide by 9 inches high." The folded back page states: The Wing Seed Company... $200,000. Inside is the section titled "The Soul of a Business."

Note 2. This is the earliest leaflet seen (Oct. 2001) that mentions soy. Address: Mechanicsburg, Ohio.

21. *USDA Bureau of Plant Industry, Inventory.*1921. Seeds and plants imported by the Office of Foreign Seed and Plant Introduction during the period from October 1 to December 31, 1916. Nos. 43391 to 43979. No. 49. 117 p. Sept. 14.

• ***Summary:*** David Fairchild is presently the Agricultural Explorer in Charge of the Office of Foreign Seed and Plant Introduction. In the "Introductory Statement," he reports "the death of our agricultural explorer, Frank N. Meyer, whose unique and interesting descriptions of plants, particularly from China, Siberia, and Turkestan, have formed for the past 10 years so important a part of the reading matter of these inventories.

"The particulars regarding Mr. Meyer's death will probably never be known. The cabled advices show that he fell overboard into the Yangtze River on the evening of June 1, 1919, from the steamer *Feng Yang Maru* while en route from Hankow to Shanghai and that his body was discovered 30 miles above the town of Wuhu, near Nanking. The facts that his wanderings in search of plants are over and his contributions to these inventories at an end are chronicled with great regret. It is perhaps a significant coincidence that his only contribution to this number is a weeping variety (No. 43791) of the dry-land elm, which was one of his substantial additions to our list of useful trees."

Soy bean introductions: Soja max: "43529-43533. An important leguminous plant valuable for food and forage.

"43529. 'Variety 1, race 1.'

"43530. 'Variety 1, race 2.'

"43531. 'Variety 1, race 3.'

"43532. 'Variety 2.'

"43533. 'Variety 3'

"43639-43641. From Canton, China. Presented by the American consul general, through the Department of Commerce. Received November 27, 1916. 'Four varieties of beans are grown in the Canton consular district: The black, the red, the yellow, and the so-called white. These beans are cultivated along the banks of the Tsochiang and the Yuchiang, in Kwangsi. The best varieties are said to come from near Siangshui and Lungchow in the southwestern part of the Province. The actual acreage under cultivation can not be estimated, on account of the fact that the beans are not cultivated in any one district but in many places and in small patches of from 1 to 3 mou. (the mou varies in different parts of China; in Canton 4.847 mou equal one acre.)' (From *Consular Report, November 7, 1916, p. 504.)*

"43639. '*White bean.* The white bean is called by the Chinese *chutou* or *pearl-shaped* bean. It is grown principally in the Province of Kwangsi, although certain quantities are produced in Kwangtung, Yunnan, and Kweichow Provinces, which are within this consular jurisdiction.' *(Consular Report, November 7, 1916, p. 504.)*

"43640. 'Black beans.'

"43641. 'Yellow beans.'"

43492 *Botor tetragonoloba* (L.) Kuntze. Fabaceæ. Goa bean. *(Psophocarpus tetragonolobus* DC.) From Mandalay, Burma. "A climbing legume grown in tropical or subtropical regions for the young tubers, which are eaten raw or cooked, and for the young pods, which are an excellent vegetable." Address: Washington, DC.

22. Guillaumin, A. 1922. Les variétés de soya d'Extrème-Orient: Origine probable du soya [The varieties of soybeans in East Asia: The probable origin of the soybean]. *Revue de Botanique Appliquee & d'Agriculture Coloniale* 2(10):254-58. June 30. [10 ref. Fre]

• ***Summary:*** "The soybean *(Le Soya; Glycine Soja* Sieb. et Zucc., *Dolichos Soja* L, *Soja hispida* Moench, *S. angustifolio* Miq.) has been cultivated in the Far East since antiquity. Shen-Nung *(le Shénon),* written up by Houandi in about 3,000 to 3,500 years before Jesus-Christ, already mentioned the soybean. Since then, its culture has expanded to Indochina, India, Malaysia, Europe, America, and Africa.

"Long ago, in Austria and in France, varieties such as *Soja d'Etampes,* were selected for their high yield. In America, efforts have long been made to obtain, for the diverse climates, both forage varieties and seed varieties. And the U.S. Department of Agriculture has assembled in its test fields more than 500 varieties, of which about 20 are currently in commerce. Among the forage varieties are (Ball 1907): Early Brown, Black Eye Brown, Peking, Wilson Five, Virginia, Barchet, Biloxi, Laredo, Atoo San [sic, Ito San?], Tarheel Black, and Wisconsin Early Black. Among those grown for their seeds are: Ito San, Manchu, Elton, Medium Yellow, Mikado, Hollybrook, Haberlandt, Mammoth, Tokyo, Guelph, Austin, Easy Cook, Morse, Hahto, Early Medium Green, Mandarin, and Chiquita.

Note 1. This is the earliest document seen (Oct. 2004) that mentions the soybean variety Black Eye Brown. However, it does not appear in Ball (1907) as stated, nor does any name even vaguely resembling it appear. The Black Eye Brown variety is mentioned in only 3 known documents, all published in France in 1922.

"Note that the forage varieties all have black- or dark-colored seeds, whereas the seed varieties have yellow or greenish seeds.

"In Turkestan it seems that the only varieties are ovoid (5.7 x 3.7 mm), brilliant yellow, with brown hilum and traversed longitudinally by a bright line." Note 2. Turkistan or Turkestan is an historical region of Central Asia, usually thought to comprise Turkmenistan, Uzbekistan, Kyrgyzstan, Tajikistan, southern Kazakhstan, western China, and northeast Afghanistan.

Note 3. This is the earliest document seen (April 2008) concerning soybeans in Turkestan, or the cultivation of soybeans in Turkestan (not including Chinese Turkestan). This document contains the earliest date seen for soybeans in Turkestan, or the cultivation of soybeans in Turkestan (not including Chinese Turkestan) (1922). The source of these soybeans is unknown. Unfortunately, it is not clear in which part of Turkestan the soybeans were grown.

"In India, soybeans are cultivated in the United Provinces and at the foot of the Hamalayas from Kashmir to Darjeeling." David Hooper (1912) distinguished five different soybean races in India.

"In Cambodia, the only known variety is ovoid (6.3 x 4.2 cm), dull yellow, brown hilum, with a long, clear white line, known as *Sandek sieng* in Cambodian and *dau nanh in Annamite*. It is cultivated along the steep banks of the Mekong River.

"In Cochin China, the soybean is cultivated only on the red soils of the provinces of Chau-doc, Baria, and Bien-Hoa; in the western provinces, cultivation is insignificant and the seeds come from Cambodia. It seems that there is only one variety, closely related to that of Cambodia, called *dau nanh* or *dau-xa,* but it is not well established / widely grown, for it bears black or brown seeds.

"In the province of Baria one can obtain two harvests in a wet year–one in September, the other in December-January. In the province of Bien-Hoa, there is only harvest.

"In Annam, there is one variety similar to that cultivated in the lower parts of the provinces of Bin-dinh, Thua-hien, Dong-hoï, and Tanh-hoa.

In Tonkin, the soybean is known as *dau tuong;* in the [Mekong] delta, one can distinguish a small, ovoid variety (5.1 x 3 mm), with a yellow seed coat and a hilum surrounded by a brownish black aura that sometimes overflows the sides. In the region of Lang-son, on the plateaus 100-500 meters in height, it is replaced by a larger variety, ovoid (7.1 x 5 mm), dull yellow, and a hilum that is uncolored [pale] or brownish.; one variety is also cultivated at Lao-kay.

"In Laos, the soybean is known as *Mok toua kon* and *Ta tone,* according to Dr. Spire, but precise information is lacking.

In the territory of Kwang-cho-wan (French: *Kouang-tchéou-wan,* in southeast China) the soybean is cultivated in the region of Taï ping, at an altitude of 30 meters. It is planted in the spring and harvested in the summer. One can distinguish two varieties here. One is very elongated (8 mm x 4.6 mm), dull yellow with a very clear brown hilum, called *Wong tao* or *Wong tao tsaï* in Cantonese. The other is small, flat (6.4 mm x 3.7 mm), dull black, with a large hilum, called *Hat tao* in Cantonese; it is absolutely the same as the variety Nigra cultivated at the botanical gardens of Cluz (Romania), and in Trieste (Italy), but different from that which is cultivated under this name at the botanical gardens of Cracow / Krakow (French: *Cracovie)* (Poland), Tabor (Czechoslovakia), and Delft (Netherlands), which is fatter, more round (7 mm x 4.8 mm) and of a velvety black color.

Note 4. This is the earliest document seen (Feb. 2005) concerning the cultivation of soybeans in Czechoslovakia (which became a country in 1918). This document contains the earliest date seen for the cultivation of soybeans in Czechoslovakia (June 1922). The source of these soybeans is unknown.

"In China, in Szechwan, only the yellow and green varieties are known. In the region of Shanghai, R.P. Courtois, of the Museum of Zi-ka-wei, has assembled an important collection of soybean varieties. Descriptions are given of varieties with the following colors and names: (1) Yellow: *Ta hoang téou* (large, yellow, almost round), *Kiu hoang téou* (ovoid, brilliant yellow). (2) Green: *Tsing pi téou* (roundish, 7.1 x 5.5 mm, clear green with clear hilum). (3) Brown: Large, ovoid (9.1 x 6.4 mm), reddish brown, with a slightly clearer hilum; no name given. (4) Black: Many varieties. (4A) Large ovoid seeds (9 x 4.3 mm), with large hilum; indigenous name unknown; (4B) A little smaller and bulging (8.3 x 5.4 mm), with ornate hilum and a longitudinal white line, named *Ta hé téou;* (4C) Ovoid (8.1 x 4.7 mm) with a wide hilum traversed by a white line, called *Hé téou;* (4D) Small (6.7 x 3.1 mm) and brownish black named *Siao hé téou;* (4E) And finally a very small, flat (6 x 2.7 mm), brownish black named *Ni téou.* By their shape, form, and color, the seeds of these last appear very similar to the American variety Laredo."

"In Europe, soya has its apostles, but it will never amount to anything more here than a small-time vegetable. Despite the Caséosojaïne at Valées near Paris, France (Li Yu-ying, 1911) and the Soyama Werke at Bockenheim, Germany (1914), the milk, cream, butter, and cheese [tofu] made from soya will never be more than ersatz. The "soy bread" is only good for diabetics and the "soy ham" *(jambon de Soja)* in nothing but a weak imitation of pork. Soybeans themselves are indigestible and require a very long time to cook–even the yellow or white varieties. Soy sprouts *(germes de Soja),* which enjoyed some popularity before the war and deserved it, for they are a nice hors d'oeuvre, are actually nothing but mung bean sprouts."

Based on other sources (most of which are cited), the writer also discusses the soybean varieties of Manchuria (Hosie 1901), and Japan (Lemarié 1910), and discusses soybeans briefly in Korea, Philippines, Netherlands Indies, Also mentions foods made from soybeans in India, Indo-China, China, Japan, and Manchuria and speculates on the origin of the soybean. Address: Asst. to the Crop Service, Museum of Natural History (Assistant du Service de culture au Muséum d'histoire naturelle).

23. Piper, Charles V.; Morse, William J. 1923. Introduction of the soybean to Europe (Document part). In: Piper and Morse. 1923. The Soybean. New York: McGraw-Hill. xv + 329 p. See p. 45-47.

• ***Summary:*** "The soybean has been grown experimentally at least in most of the European countries but in general the climatic conditions are not well suited to its culture. Some measure of success has been had however in south Europe, but the crop has never become of much importance.

"France: Paillieux (1880) has traced in detail the records of early attempts to introduce the culture of the soybean into France. Packets of soybean seeds from missionaries in China were received at the Jardin des Plantes, Paris, in 1739 and at frequent later dates beginning with 1834. The plants were very probably grown at the botanical garden since 1740, certainly so in 1779, and from 1834 to 1880 without interruption. In 1821, an unusually warm season, a Chinese variety had matured seed at Champ-Rond near Etampes. Beginning with 1855 the *Société d'Acclimatation* distributed numerous packets of seed, but did not succeed in establishing a permanent culture of the plant. In 1868 M. Chauvin cultivated several varieties at Cote d'Or, and the culture there has since continued. In 1874 the Society of horticulture of Etampes began experiments that continued until 1880. In 1879 a Chinese variety matured well at Marseilles. In 1880 Vilmorin-Andrieux & Company introduced into France one of the varieties tested by Haberlandt in Austria, which variety has proven well adapted to French conditions. This variety is presumably that now known in France as 'Yellow Etampes' which is the same as that known in the United States as 'Ito San.'

"The soybean is now rather widely grown in France but apparently is not an important crop. No definite statistics of its culture seem to have been published. Presumably it is grown more as a garden vegetable than as a field crop. Apparently only four varieties were cultivated in France before 1910 namely: Yellow Etampes (= Ito San); Early Black from Podolia (= Chernie); Brown (= Ogemaw); and Extra Early Black (= Wisconsin Black). All of these are short season varieties, indicating that the later sorts will not mature in France.

"Italy: The cultivation of the soybean in Italy dates from about 1840. [Question: What is the source of this date?] At the present time it is grown sparingly in the compartments of Liguria, Emilia, Marches, and near Naples. In no part of Italy does it seem to be a crop of prime importance.

"Austria and Germany: A great impetus was given to the culture of the soybean in Europe by the experiments of Prof. Friedrich Haberlandt (1878) of Vienna, in 1875 and subsequent years. Haberlandt obtained seed of nineteen varieties at the Vienna exposition in 1873. These were as follows:" Five yellow-seeded, three black-seeded, three green-seeded, and two brown-red-seeded varieties from China. One yellow-seeded and three black-seeded varieties from Japan. One black-seeded variety from Trans-Caucasia. One green-seeded variety from Tunis.

"Of these only four varieties matured at Vienna in 1875, namely, two yellow-seeded, one black-seeded and one brown-red-seeded, all from China. The black-seed sort was so late that it matured but few seeds. Of the other varieties some did not even come into bloom, while the remainder produced blossoms or young pods too late in the fall to mature.

"In 1876 the two yellow and the brown varieties were tested by cooperators in Hungary, Bohemia, Steirmark [Steiermark, Austria], Bukowina [an area divided between Romania and the USSR after 1945], Moravia, and Silesia, favorable results being secured in each case.

"In 1877 seeds of all four varieties were distributed to 148 cooperators, mostly in Austria-Hungary, but some in Germany and Russian Poland, and one each in Switzerland and Holland. Most of the tests gave promising results.

"Haberlandt (1878) published the results of his investigations in much detail, and his results had great influence in stimulating further investigations. All of the varieties that Haberlandt was able to mature were short season varieties, which in general are far less productive than later sorts.

"England: According to Aiton (1812) the soybean was grown as early as 1790 at the Royal Botanic Gardens, Kew, but merely as a botanical curiosity. The soybean has apparently never been grown as a crop in England, where indeed only the earliest varieties would be expected to mature.

"Investigations on the adaptability of the soybean have been carried on by Dr. J.L. North of the Royal Botanic Gardens during recent years. Early varieties were introduced from numerous sources. With careful selections two or three quite promising early strains have been obtained which mature fully and give good yields of seed under English conditions."

24. Kvashnina, E.S. 1928. Predvaritel'noe soobschenie ob obsledovanii boleznei lekarstvennykh i tekhnicheskikh kul'tur na Sev. Kavkaze [Preliminary report of the survey of diseases of medicinal and industrial plants in North Caucasus]. *Izvestiia Severo-Kavkazskoi Kraevoi Stantsii Zashchity Rastenii (Bulletin of the North Caucasian Plant Protection Station)* No. 4. p. 30-46. [14 ref. Rus; ger]
• ***Summary:*** Discusses: Bacterial diseases, Bacterial scorch. Soybean suffered from 2 undetermined bacterial diseases, one on leaves and the other on leaves and pods.

25. Shchegolev, V.N.; Mamonov, B.A. 1929. [The soybean pests in the northern Caucasus]. *Biulleten Severo-Kavkazskaia Kraevaia Sel'skokhoziaistvennaia Optynaia Stantsiia (Bulletin of the North Caucasian Agricultural Experiment Station, Division of Entomology (U.S.S.R.))* No. 287. 32 p. [Rus]*
• ***Summary:*** States that the lima-bean pod borer *(Etiella zinckenella)* attacks soybeans in Russia. Address: USSR.

26. Tropova, A.T. 1929. Aktivnaia kislotnostov kletocnogo soka nekotor... [The active acidity of the cell sap of some plants and their susceptibility to fungus and bacterial infection]. *Izvestiia po Opytnomu delu Severnogo Kavkaza,*

Rostov na Donu (J. of Agricultural Research, North Caucasus) 13:3-16. [16 ref. Rus; eng]
• ***Summary:*** Cell sap of the leaves of 18 cultivars of soybean were checked. Discusses Bacterium sojae (=Pseudomonas glycinea), Don Donu Dony and Kaukasus. Address: USSR.

27. Nagorny, P.I.; Eristhavi, E.M. 1929. [A brief survey of plant diseases in Abkhazia in 1928]. *Agricultural Experimental Station of Abkhasia, Publication* No. 38. 28 p. See p. 16. [23 ref. Rus]
• ***Summary:*** Includes a brief description of *Phyllosticta sojaecola* on soybean. Abkhazia has been formally known as the Abkhaz Autonomous Soviet Socialist Republic since 1919. Its capital is Sukhumi. Situated inside of the Republic of Georgia on the Black Sea, it is inhabited mostly by Muslims.

Note: This document contains the earliest clear date seen for soybeans in the Republic of Georgia or for the cultivation of soybeans in the Republic of Georgia (1929). The source of these soybeans is unknown.

28. *Nauchnye Trudy. Series 1.*1929—. Serial/periodical. Ordzhonikidze, Georgia SSR: Vsesoiuznaia Akademiia Sel'-khoz. Nauk Imeni V.I. Lenina (V.I. Lenin All Union Academy of Agricultural Sciences). [Rus]
• ***Summary:*** Nauchnye Trudy means "Scientific work or Academic publication." Address: USSR.

29. *Nauchnye Trudy. Series 1.*1929—. Serial/periodical. Ordzhonikidze, Georgia SSR: Gorskaia Zonal'naia Kukuruzno-soevo- Kartofel'naia Opytnaia Stantsiia (Mountain Zone Agricultural Experiment Station for Corn, Soybeans, and Potatoes). [Rus]
• ***Summary:*** Nauchnye Trudy means "Scientific work or Academic publication." Address: USSR.

30. [Corn and soya]. 1930. Tblisi, Georgia: State Press. 46 p. 20 cm. [Geo]
• ***Summary:*** The chapter titled "Importance of soya exports," by Pavlov (p. 26-27) states that up until 1928, all of the world's soybean exports came from Manchuria. Georgia exported a significant quantity of soybeans to Denmark. Address: Georgia.

31. Tupikova, G.P. 1930. Soya [Soya]. Leningrad, USSR: All Union Academy of Agricultural Sciences. 154 p. 23 cm. [53 ref. Rus]
• ***Summary:*** Contains 88 illustrations. Page 12 states: In the Caucasus (see Wuchino) the first commercial cultivation of soybeans dates from the 1880s. The soybeans were sent by Sturua from Japan to the Tblisi Botanical Garden [in Georgia]. In 1927 the soybean started to be processed for its oil. Note: Tupikova is a woman. Address: USSR.

32. Savich, I. 1931. Sorta soi; opredelitel sortov soi [Varieties of soybeans; The selection of varieties of soybeans]. Moscow & Leningrad, USSR: State Press of Agricultural and Kolkhoz Literature. 64 p. [39 ref. Rus]
• ***Summary:*** At the top of the title page is written "Research Institute of Soya" *Nauchno-issledovatel'skii Institut Soi.* Contains an excellent bibliography of Russian-language works on the soybean. Page 50 discusses Transcaucasian soybean varieties, and landraces of "Imerety" soya. Address: USSR.

33. Gancharyk, M.M. 1932. Ab kul'tury soi u BSSR [On soybean cultivation in the Belorussia SSR (White Russia)]. Mensk [Minsk]. 15 p. [Rus]
• ***Summary:*** The author states (p. 10) that only after 1917 did soybean cultivation begin to expand in Belarus. On the same page he also states that the article by Strazh and Myatel'ski (1930) mentions the first research with soybean in Gorki in 1921. But in 1931 all of this work with soybeans was concentrated in the Biological Institute of the Belarus Academy of Sciences in Minsk.

The results of this research are described on page 5. The author says that it is very important to import soybean seeds from East Asia, the South Caucasus, or the Ukraine, and also to grow the soybean in Belarus. Address: USSR.

34. Bailey, Ethel Zoe. 1933-1966. Glycine soja–Foreign sources. Part I. Ithaca, New York: L.H. Bailey Hortorium. 3 cards. Unpublished.
• ***Summary:*** *Glycine soja* is the scientific name for the wild soybean, an annual plant. This name has never been used for the cultivated soybean.

These three hand-written index cards are in the Bailey Hortorium's index system of nursery catalogs and/or botanic garden seed lists developed by Ethel Zoe Bailey. In this index system, there are eleven major cards and eight minor cards related to the soybean. On each card are two-part coded entries referring to botanic gardens or nurseries.

Part 1 is the code for the name of the botanic garden, and part 2 is the last two letters of the earliest year in which the plant for that card appeared in this garden's catalog. For example "Buit 33" refers to the 1933 catalog from Buitenzorg, Java. [LR 1982] means that a list of seeds and plants (whether or not it contained soy) was "Last Received" from that source [Buitenzorg] in 1982. There are 72 listings for *Glycine soja* from foreign sources. As of Nov. 1997 most of the catalogs and seed lists mentioned below are available in the Bailey Hortorium, located in Mann Library, Cornell University, Ithaca, New York.

(1) Buit. 33–'s Lands Plantentuin Gov. Bot. Garden, Buitenzorg [later renamed Bogor], Java, Indonesia, 1933 [LR 1977; now known as Botanic Gardens, Kebun Raya, Bogor, Indonesia]. (2) Saig. 36–Hortus Botanicus

Saigonensis, Saigon, Vietnam, 1936 [LR 1964]. (3) Turc. 37–Hortus Botanicus Turcomanicus, Turkonen Botanical Garden, 744012 Ashkhabad, Turkmen S.S.R. [later Turkmenistan], 1937 [LR 1976]. (4) Wey. 38–Michael A. Weymarn, 20 Grodekoosky Blvd., Harbin, Manchuria, 1938 [Later part of China]. (5) Lenin. 39–Botanical Garden (Botanitschesky Institut), Leningrad, Russia, USSR, 1939 [LR 1976].

(6) Buc. 40–Hortus Botanicus Universitatis Bucurestiensis "C.I. Parhon," Sos. Cotroceni nr. 32, R.P.R., Bucharest 15, Romania, 1939. (7) Mort. 39–La Mortola (Giardino Botanico Hanbury), Ventimiglia 18036, Italy, 1939 [LR 1975]. (8) Co. 41–Hortus Botanicus Conimbrigensis, Coimbra, Portugal, 1941 [LR 1982]. (9) Port. 42–Estacao Agronomica Nacional, Oeiras (Lisboa), Portugal, 1942 [LR 1982] (10) Dach. 43–All Union Scientific Research Institute of Medicinal Plants, Lenino-Dachnoe, Moscow District, Russia, USSR, 1943 [LR 1943]

(11) Brux. 40–Nationale Plantenuin van Belgie (formerly named Hortus Botanicus Bruxellensis), Dienst Lavende Verzamelingen, Domaine van Bouchot, B-1860 Meise (Brussels), Belgium, 1940 [LR 1981]. (12) Gater. 49–Institut für Kulturpflanzenforschung, DDR-4325 Gatersleben, Kr. Aschersleben, Bezirk Halle, East Germany, 1949 [LR 1981]. (13) Camb. 48–University Botanic Garden (formerly named Horto Cantabrigensis Academiae), Cambridge, England, 1948 [LR 1981]. (14) B.A. 51–Division de Exploraciones e Introduccion de Plantas, Ministerio de Agricultura de la Nacion, Buenos Aires, Argentina, 1951 [LR 1958]. (15) Jena 52–Botanischen Gartens der Friedrich Schiller Universitaet, Jena, Germany, 1952 [LR 1977].

(16) Modena 53–Istituto ed Orto Botanico [Botanical Garden] dell'Universita di Modena, Modena, Italy, 1953 [LR 1979]. (17) Munchen 55–Botanischer Garten Muenchen-Nymphenburg, Menzi ger Str. 63 BRD, D-8000 Muenchen [Munich] 19, Germany, 1955 [LR 1981]. (18) Tar. 56–Villa Taranto Gardens, Pallanza, Italy, 1956 [LR 1974]. (19) Berl. 55–Botanischer Garten, Berlin-Dahlem, Germany, 1955 [LR 1975]. (20) Ruzy. 57–Research Institute for Plant Production, Ruzyne at Prague, Czechoslovakia [in the Czech Republic since Jan. 1993], 1957 [LR 1957].

(21) Kohr. 57–Gerhard Kohres, Bahnstrasse 101, D-6101 Erzhausen, Darmstadt, Germany, 1957 [LR 1973]. (22) Szeg. 57–Hortus Botanicus Universitatis Szeged, Szeged, Hungary, 1957 [LR 1976]. (23) Brno. 58–Botanika Gardeno de Veterinara Universitato, Brno 12, Czechoslovakia [in the Czech Republic since Jan. 1993], 1958 [LR 1968]. (24) Zurich 59–Botanischer Garten der Universitaet Zuerich (and Parco Botanico del Cantone Ticino, Isole di Brissago, Lago Maggiore), Zollikerstrasse 107, CH-8008 Zurich, Switzerland, 1959 [LR 1977]. (25) Gott. 58–Botanischer Garten der Universitaet Goettingen, Gottingen, Germany, 1958 [LR 1981].

(26) Erl. 58–Botanischer Garten der Universitaet Erlangen, Schlossgarten 4, Erlangen, Germany, 1958 [LR 1977]. (27) Hohen. 58–Botanischer Garten der Landwirtschaftlichen Hochschule Stuttgart-Hohenheim, Stuttgart-Hohenheim, Germany, 1958 [LR 1981]. (28) Kassel 58–Botanischer Garten der Stadg. Kassel, Bosestrasse 15 (Park Schonfelf), Kassel, Germany, 1958 [LR 1965]. (29) Marb. 58–Botanischer Garten der Philipps-Universitaet, Auf den Lahnbergen, 3550 Marburg 1, Germany, 1958 [LR 1981; Formerly located at Pilgrimstein 4]. (30) Bonn U. 58–Botanischer Garten der Universitaet Bonn, Meckenheimer Allee 171, Bonn, Germany, 1958 [LR 1979].

(31) Glasgow 60–Botanic Gardens, Glasgow W. 2, Scotland, UK, 1960 [LR 1982]. (32) Lond. 60–University of London, Botanical Supply Unit, Elm Lodge, Englefield Green, Surrey, England, UK, 1960 [LR 1981]. (33) Liv. 61–University of Liverpool Botanic Gardens, Ness, Neston, Wirral, Cheshire, England, UK, 1961 [LR 1982]. (34) Kew 61–Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AB, England, UK, 1961 [LR 1982]. (35) Monpl. 62–Jardin des Plantes, Universite de Montpellier, Faubourg St. Jaumes, Montpellier, France, 1962 [LR 1978].

(36) Komen. 62–Botanicka Zahrada Univerzity Komensheko, Bratislava, Czechoslovakia, 1962 [LR 1965; Bratislava has been the capital of Slovakia since 1992]. (37) Humb. 63–Institut für Botanik der Landwirtschaftlich-Gaerternischen Fakultaet der Humboldt Universitaet zu Berlin, Invalidenstrasse 42, Berlin 4, Germany, 1963, [LR 1964]. (38) Hok. 64–Botanic Garden of the Faculty of Agriculture, Hokkaido University, Hokkaido, Japan, 1964 [LR 1982]. (39) Padova 63–Istituto Botanico dell'Universita, Via Orto Botanico 15, Padova [Padua], Italy, 1963 [LR 1980]. (40) Kosice 63–Botanicka zahrada University P.J. Safarika, Kosice, Slovakia, 1963 [LR 1981].

(41) Pal. 64–Hortus Botanicus Universitatis Palackianae, Olomouc, Leninova 26, Czechoslovakia, 1964 [LR 1979]. (42) Cluj. 63–Hortus Botanicus Clusiensis, Universitas "Babes-Bolyai," Str. Republicii Nr. 42, 3400 Cluj Napoca, Romania, 1963 [LR 1981]. (43) Pecs 63–Hortus Botanicus Pecs, Ifjusag Utja 6, Pecs, Hungary, 1963 [LR 1976]. (44) Vasak 63–Vladimir Vasak Agricultural Research Station, Sumperk-Temenice, Czechoslovakia [in the Czech Republic since Jan. 1993], 1963 [LR 1963]. (45) Bud. 64–Hortus Botanicus Universitatis Hungariae, Illes u. 25, Budapest VIII, Hungary, 1964 [LR 1981].

(46) Trieste 64–Universita degli studi di Trieste, Italy, 1964 [LR 1964]. (47) Nijm. 65–Hortus Botanicus Universitatis Noviomagensis, University of Nijmengen, Dreihuizerweg 200, Nijmegen, Netherlands, 1965 [LR 1981]. (48) Gob. 66–Prachi Gobeson, Narendra Nager (Dunlop Bridge), P.O. Belgharia, Calcutta-56, India, 1966

[LR 1966; Formerly located at Anandrapuri, P.O. Barrackpore, Calcutta]. (49) Ferr. 65–Hortus Botanicus Ferrariensis, Istituto ed Orto Botanico dell'Universita di Ferrara, Ferrara, Italy, 1965 [LR 1976]. (50) Rouen 66–Jardin Botanique de la Ville de Rouen, 7 Rue de Trianon, Rouen, France, 1966 [LR 1981]. Continued. Address: L.H. Bailey Hortorium, 462 Mann Library, Cornell Univ., Ithaca, New York 14853-4301. Phone: 607-255-7981. Fax: 607-255-7979.

35. Bailey, Ethel Zoe. 1934-1976. Glycine hispida–Foreign sources. Ithaca, New York: L.H. Bailey Hortorium. 2 cards. Unpublished.

• ***Summary:*** *Glycine hispida* was an early scientific name for the soybean given by C.J. Maximowicz in 1873. It was superseded by *Soja max* Piper in 1914, and finally by the current name, *Glycine max* (L.) Merrill in 1917.

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Part 1 is the code for the name of the botanic garden, and part 2 is the last two letters of the earliest year in which the plant for that card appeared in this garden's catalog. For example "Will. 34" refers to the 1934 catalog of J.P. Williams & Bros., Colombo, Ceylon (Renamed Sri Lanka in 1972) [LR 1982] means that a list of seeds and plants (whether or not it contained soy) was "Last Received" from that source [J.P. Williams] in 1982. There are 34 listings for *Glycine hispida* from foreign sources. As of Nov. 1997 most of the catalogs and seed lists mentioned below are available in the Bailey Hortorium, located in Mann Library, Cornell University, Ithaca, New York.

(1) Will. 34–J.P. Williams & Bros., 94 Wall St., Kotahena, Colombo, Ceylon, 1934. (2) Kirst. 37–National Botanic Garden Kirstenbosch, Private Bag X7, Claremont 7735, South Africa, 1937 [LR 1983; Formerly in Newlands, C.P.]. (3) Alger 36–Jardin Botanique, Universite d'Alger, Algiers, Algeria, 1936 [LR 1956]. (4) Lenin. 40–Botanical Garden (Botanitschesky Institut), Leningrad, Russia, USSR, 1940 [LR 1976]. (5) Co. 41–Hortus Botanicus Conimbrigensis, Coimbra, Portugal, 1941 [LR 1982].

(6) Brux. 40–Nationale Plantenuin van Belgie (formerly named Hortus Botanicus Bruxellensis), Dienst Lavende Verzamelingen, Domaine van Bouchot, B-1860 Meise (Brussels), Belgium, 1940 [LR 1981]. (7) Kew 47–Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AB, England, UK, 1947 [LR 1982]. (8) Copen. 48–Universitets Botaniske Have Kobenhaven, ø Farimagsgade 2B, DK-1353, Copenhagen K, Denmark, 1948 [LR 1981]. (9) Gand. 52–Plententuin der Rijksuniversiteit (formerly named Hortus Botanicus Gandavensis), K.L. Ledeganckstraat 35, B-9000 Gent, Belgium, 1952 [LR 1981]. (10) Munchen 53–Botanischer Garten Muenchen-Nymphenburg, Menzi ger Str. 63 BRD, D-8000 Muenchen [Munich] 19, Germany, 1953 [LR 1981].

(11) Gen. 58–Conservatoire et Jardin Botaniques de la Ville Geneve, Case postale 60, CH. 1292 Chambesy / Geneva, Switzerland, 1958 [LR 1981]. (12) Basel 57–Botanischer Garten der Universitaet Basel, Schonbienstrasse 6, Basel, Switzerland, 1957 [LR 1980]. (13) St. A. 57–University Botanic Gardens, St. Andrews, Scotland, UK, 1957 [LR 1982]. (14) Ant. 58–Hortus Botanicus Antveroiensis Plantentuin, Gerard le Grellelaan 5, Antwerp, Belgium, 1958 [LR 1973]. (15) Kassel 58–Botanischer Garten der Stadg Kassel, Bosestrasse 15 (Park Schonfelf), Kassel, Germany, 1958 [LR 1965].

(16) Erevan 58–Hortus Botanicus Academiae Scientiarum RSS Armeniae, Yerevan (Epebah), Kanaker, Armenia, 1958 [LR 1974]. (17) Torino 58–Hortus Botanicus Universitatis Taurinensis, Istituto ed Orto Botanico dell'Universita, Viale Matthioli 25, Torino [Turin], Italy, 1958 [LR 1978]. (18) Ferr. 61–Hortus Botanicus Ferrariensis, Istituto ed Orto Botanico dell'Universita di Ferrara, Ferrara, Italy, 1961 [LR 1976]. (19) Zag. 61–Botanicki VRT Univerziteta, Hortus Botanicus Facultatis Scientiarum Naturalium et Mathematicarum Universitatis Zagrabiensis, Marculicev TRG 9a, Zagreb, Yugoslavia [Croatia by June 1991], 1961 [LR 1961]. (20) Alma 61–Hortus Botanicus Academiae Scientiarum RSS Kazachstan, Alma-Ata 480070, Kazakhstan, USSR, 1961 [LR 1976].

(21) Cra. 61–Hortus Botanicus Instituti Agronomici Craiovensis, Strada Communa din Paris no. 24, Craiova, Romania, 1961 [LR 1963]. (22) Wars. 62–Hortus Botanicus Universitatis Varsaviensis, Warsaw, Poland, 1962 [LR 1981]. (23) Cluj. 62–Hortus Botanicus Clusiensis, Universitas "Babes-Bolyai," Str. Republicii Nr. 42, 3400 Cluj Napoca, Romania, 1962 [LR 1981]. (24) U. Kiev 63–Hortus Botanicus Fominianus Universitatis Kioviensis, Kiev, Ukraine, USSR, 1963 [LR 1982]. (25) Kiev 63–Hortus Botanicus Centralis Academiae Scientiarum UCR, Via Timirjasevska 1, Kiev 14, Ukraine, USSR, 1963 [LR 1979].

(26) Oslo 66–Hortus Botanicus Universitatis Osloensis, Oslo, Norway, 1966 [LR 1983]. (27) Gren. 69–Jardin de l'Institut Botanique Alpin du Lautaret, 9 Place Bir-Hakeim, Grenoble (Isere), France, 1969 [LR 1975]. (28) Stras. 69–Jardin Botanique de Strasbourg, 28 Rue Goethe, Strasbourg, France, 1969 [LR 1982]. (29) Pratap 68–Pratap Nursery & Seed Stores, P.O. Premnagar, Dehra Dun-6 [Uttar Pradesh], India, 1968 [LR 1971]. (30) Tubin. 69–Botanischer Garten der Universitaet Tuebingen, Tubingen, Germany, 1969 [LR 1980].

(31) Cluj. 70–Hortus Botanicus Clusiensis, Universitas "Babes-Bolyai," Str. Republicii Nr. 42, 3400 Cluj Napoca, Romania, 1970 [LR 1981]. (32) Lyon 71–Jardin Botanique

de la Ville de Lyon au Parch de la Tete-d'Or, Lyon, France, 1971 [LR 1973]. (33) Mainz 74–Botanischer Garten dr Johannes Gutenberg Universitaet, 6500 Mainx/Rhein, Germany, 1974 [LR 1977]. (34) Turc. 76–Hortus Botanicus Turcomanicus, Turkonen Botanical Garden, 744012 Ashkhabad, Turkmen S.S.R. [later Turkmenistan], 1976 [LR 1976]. Address: L.H. Bailey Hortorium, 462 Mann Library, Cornell Univ., Ithaca, New York 14853-4301. Phone: 607-255-7981. Fax: 607-255-7979.

36. Matveeff, G.N. 1934. [Varieties of soybeans in Georgia]. Tblisi, Georgia: Georgian Press. 146 p. Scientific Research Works, Series A, Issue No. 1. [51 ref. Geo]

• ***Summary:*** Table 1 (p. 8-9) shows the increase in the area planted to soybeans in Georgia from 1930 to 1933. Part 1 shows the area planted to soybeans only ("pure sowings"); this value increased from 626 ha in 1930 to 1,653 ha in 1933. Part II shows the mixed plantings converted to pure sowings; this value decreased from 49,544 ha in 1930 to 28,878 ha in 1933. Part III shows the total planted area (pure + mixed); this value decreased from 50,170 ha in 1930 to 30,531 ha in 1933. Part 4 shows soybean area as a percentage of total area; this figure decreased from 5.09% in 1930 to 3.05% in 1933. A note (p. 9) explains that this table is based on statistical data received from the Narcomzem (Agricultural Department) of Georgia.

Page 10 states that in 1932 a soymilk manufacturing plant was established in Tblisi. Page 11 states that soybeans exported from the port of Batumi (Georgia, on the Black Sea) to Germany and Denmark sold for ¼ to ½ to price of soybeans purchased from Manchuria.

Table 2 (p. 12) shows soybean production in Georgia in 1931 and 1932, and how these soybeans were utilized. Soybean production was 10,760 tons in 1931, and 3,611 tons in 1932. For the two years (respectively), 32.6% and 48.8% were exported (outside the USSR), 21.2% and 22.5% were exported to other countries inside the USSR, 27.9% and 2.6% were delivered to various organizations in Georgia for use in making edible oils and confections.

Page 10 states that G. Struev [G. Sturua] (1882) gave the names of some varieties he obtained from Japan. According to G. Japardize, S. Timofeev, and E. Wuchino, soybeans were introduced to Georgia during the 1870s.

Page 20 states: The first information about the soybean in Russia was from the year 1874 (See G. Tupikova). Address: Georgia.

37. Lobanov, V.J. 1934. Dunganskaya soya [The Dungan soybean]. *Trudy po Prikladnoi Botanike, Genetike i Selektsii (Bulletin of Applied Botany, Genetics and Plant Breeding, Leningrad)* No. 9. p. 85-86. Series A. [Rus]

• ***Summary:*** A brief description of this plant native to China with notes on its properties and cultivation.

The soybean is considered to have been cultivated for several thousand years in the countries of Eastern Asia: China, Manchuria, Korea and Japan. In the last few years enormous areas were allotted to soybeans in North America, where it is sown as an oil and feed plant. Since 1924, planting of soybeans has also increased quickly in the USSR. It is sown here as an oil plant; seeds are supplied mainly from China and Manchuria.

The question of the creation of different varieties, adapted often to dry conditions, is a pledge of quick development of this crop; because the discovery of the local soybean we describe is considered more than a 60 year old crop in southeastern Kazakhstan, doubtlessly it has colossal value and a big future for the development of the soybean crop in arid districts *(raiony).*

In 1870 one of the Chinese nationalities, the Dungan (the Russian term for the Hui, China's second largest minority), resettled from Western China to the boundaries of the Semirechenski oblast'. They brought with them many varieties of soybeans, [a crop] that was unknown there at that time. They began to grow soybeans in small quantities. In a number of places this crop found a new homeland for itself, but only among the Dungans themselves, who by rights considered themselves good "cookery specialists." Soybeans didn't transfer to the Russian settlements and Aborigine population–Kazakhs and Kirghiz, because of the relative isolation of the Dungan and the inability of Russians and Kazakhs to cultivate the soybean, even to prepare food from this plant.

Among these Dungan people soybeans have been protected up to this time, true, only in a few settlements and in very small quantities, in personal plots.

While taking part in an expedition, we visited the Dungan settlements of Shor-Tiube and Karakuna, which are located 60 km. from the city of Frunze, in the territory of the Kurdaiskii district *(raion)* of the Kazakh ASSR. In the territory of the Kirghiz ASSR we visited the settlement of Aleksandrovskii, 30 km. from Frunze and the settlement of Irdyk, 10 km. from Karakola, on the eastern shore of Lake Issyk-kulia.

In the settlement of Irdyk, Dungans tried to cultivate soybeans, but unsuccessfully. Late spring frosts, observed in this district *(raion)* still in June, and drying winds, blowing from Boanskii canyon, constantly destroyed the plantings of soybeans. In the settlement of Aleksandrovskii, a local soybean was cultivated earlier, but in the last 2-3 years, for some reason it hasn't seeded and thus we weren't able to get seeds from there. Meanwhile natural conditions of this district *(raion)* were favorable to the growing of soybeans and in 1931 in a number of collective farms *(kolkhozes),* imported soybeans gave [break in text] mostly greenish with green seed-lobes. The fat in it, according to one analysis, turned out to be 20-22%, boiling and taste of the Dungan soy is better than Far-Eastern-Manchurian selected varieties.

Separate bushes collected by us were very productive. There were plants that had more than 454 beans. All the plants were thickly covered with beans, and had a compact bush / shrub, but it was very important during the reaping of the harvest. The stalks were climbing and half climbing– there are even specimens with straight ends of the stalks. All the plants are quite covered with white or red little hairs. The height of the plants is from 60 to 110 cm. The absolute weight of the seeds is from 70-122 grams. The height of the attachment of the first bean varies from 6 to 10 cm. The color of the seeds varies from yellow to intense green, with yellow or green seed-lobes. The form of the seed is flat, oval in length, reniform (botanical term). The color of the hilum / scar *(commisure*–botanical term) varies from light to dark brown, with a darker thin border. A mosaic of light brown, weak, diffused.

If we are to judge by individual samples that we found, it is possible to say that the Dungan soybean has a great productivity; this is evident by its good inclination to intensive solar insulation and to the relatively low humidity in the air in regions where it is now grown. The low boiling point and good taste of the Dungan soybean, a sufficient percent of fat, gives it the possibility to be chosen for wide use because of these qualities for the growing of a highly productive variety, accustomed to a continental climate and in the first case for the growing of a valuable variety / species for food. Our search is not yet over to continue in new regions along the western border of China. Our collection of Dungan soy is still growing with new valuable materials from these regions.

Without a doubt, the soybean we found cultivated in local land since 1870, after carrying out the selection work, offers the basis for a wide spread of this culture in Kazakhstan, Kirghizia and areas nearby; in these indicated geographical areas the soybean doubtless is a very valuable plant.

Note 1. This is the earliest document seen (April 2008) concerning soybeans in Kazakhstan, or the cultivation of soybeans Kazakhstan. This document contains the earliest date seen for soybeans in Kazakhstan, or the cultivation of soybeans in Kazakhstan (1870). The source of these soybeans was the Hui / Dungan people of Western China.

Note 2. This document contains the earliest date seen for soybeans in Central Asia, or the cultivation of soybeans in Central Asia (1870).

Note 3. China's estimated 7.5 million Hui are concentrated mainly in the Ningxia Hui Autonomous Region in north central China bordering on Inner Mongolia. However they are also perhaps the most "scattered ethnic group in the country."

"Speaking only Chinese, the Hui have so well assimilated into Chinese society that they are almost indistinguishable, except in dietary and religious aspects, from the Han. Also called Chinese Muslims, they have a strong sense of community, with the mosque serving as the focus of communal life."

"The Hui have produced many famous scientists and literary and political figures, including Zheng He, a well-known Ming navigator... Outside China Hui can also be found in southeast Asia and Russia." (Source: The Encyclopedia of the Peoples of the World, ed. by Amiran Gonen. 1993). Address: Zone Station of New Oil-yielding Crops of southwestern Kazakhstan.

38. Kurdiani, I.; Nakashidze, E. 1935. [Oilseed plants]. Tblisi, Georgia: Georgian Press. 140 p. [Geo]
• ***Summary:*** The section titled "Soya" (p. 21-23) states (p. 22) that the soybean was introduced to France from China in 1793. In 1873 it appeared at the Vienna International Exhibition. At the end of the 19th century the soybean was grown in Russia. "In our country [Georgia] it was first cultivated in the 1860s."

Illustrations (line drawings) show: (1) A soybean plant, with a cluster of pods shown separately. (2) Soybean leaves, flowers, and flower parts. (3) Soybean pods, closed and opened, with individual beans. (4) The root system with nodules. Address: Georgia.

39. Kaltenbach, D.; Legros, J. 1936. Soya: Selection, classification of varieties, varieties cultivated in various countries: Eastern Europe (Document part). *Monthly Bulletin of Science and Practical Agriculture (International Institute of Agriculture, Rome)* 27(6):221T-33T. June.
• ***Summary:*** "5. Hungary. Since 1870-1880 several attempts have been made to introduce soya cultivation into Hungary, but, although climatic conditions and particularly the temperature are more favourable than in Germany, it has not been possible, up to the present, to develop this cultivation. Soya is only grown to supply the forage requirements in farms and is used solely for feeding live-stock (pigs, dairy cows). This check on soya growing on a commercial scale is due partly to the fact that up to the last few years, no early varieties with a high yield were available and partly owing to the fact that soya could not be sold at a price remunerative to the producer. [Note 1. The source of this 1870 date is unknown].

"Trials in cultivation are carried out at the Royal Hungarian Station for Plant Cultivation at Magyarovar and questions relative to feeding live-stock are studied at the Station of Animal Physiology at Budapest.

"8. Poland. The first attempts to introduce soya into Poland date back to the end of the 19th century. These attempts were not crowned with success and were abandoned until 1923... Varieties grown in the Trial Garden of the Vilna University (U.S.B.): Brown Vilna soya, brown Szlotenice soya, brown Dublany soya, yellow C.S.S. soya, yellow Canadian soya from Montreal, yellow Canadian

soya (Quebec 92), yellow Podolia soya, black soya (Granum 4041), black soya.

"It may be concluded that the soya varieties of Vilna, Szlztenice and Dublany may be grown in the whole of Poland as they are early and can mature even in the province of Vilna.

"9. Rumania [Romania]. Soya growing was introduced in 1910-13. The principal research centrés are the Phytotechnical Station of the Institute of Agronomical Research of Rumania, Budapest, and the various regional experiment Stations of the Institute: Baraganul (district of Ilomutsa); Valul lui Traian (district of Constantsa); Cenad (district of Timis); Tighina (district of Tighina); Agricultural School of Medias (district of Tarnava-Mare).

"At present the following varieties are cultivated: Platter gelbe–Braun gelbe I and II–Platter Riesen–Black Eyebrow–R.E.A.Z.–Ossyek. Varieties rich in oil are sought for. Harvesting takes place in August and September. Yields in seeds vary from 7 to 18 quintals per hectare. Note 2. 1 quintal = 100 kg.

"11. Czechoslovakia. "Trials in acclimatisation of soya in Czechoslovakia are carried out with non-improved foreign varieties and varieties improved in the country. Results show that the most suitable varieties are those with yellow seeds obtained from M. Frankel at Siarovicia and, for Moravia, the selected Austrian Platt varieties.

"The improved varieties of Czechoslovakia were bred by F.A. Brillmayr of the Osterreichisch Bundesanstalt für Pflanzenbau and Pflanzenzuechtung (Federal Plant Cultivation and Selection Station, Platt, South Austria). They are known under the general name of 'Plattske.' The cultivation of selected Austrian varieties was introduced into Czechoslovakia by Dr. Hanreich at Vlasatici, near Pohorelic (Moravia)... These varieties came from the State Agricultural Trial Station at Roudnice.

"13. U.S.S.R. It is only a few years ago that the U.S.S.R. contemplated soya growing from an economic standpoint. Up to 1927, this plant was of little importance in the economy of the country. Just before the Revolution, soya crops occupied 4,000 hectares. The best regions for this cultivation are the northern parts of the Caucases [Caucasus]: Transcaucasia, the Ukrain [Ukraine] and districts on the Pacific Ocean (province of Primorskaja). These are the best seed producing regions. In addition, soya may be grown for forage also in the northern regions where maturation is not always regular or sure...

"All the land suitable for soya growing is distributed into 5 zones and subzones according to the possibility of successful cultivation...

"Varieties: Amour 01, Besentchuk No. 8, Chestnut, Dronsag soja No. 905, Dronsag soja No. 907, Dunfield, Ebony, Gounciulin, Habarovsk (Habaro) No. 109, Harbin No. 19, Harbin No. 118, Harbin No. 199, Harbin No. 199-b, Harbin No. 231-a, Hollybrook, Illini, Krouchoula No. 9/3, Krouchoula No. 10/10, Manchu, Mandarin, Mansoy, Minsoy, Peking, Stavropol Local, Transcaucasian, Old Ukrain [sic, Ukraine], Virginia, Wilson, Wisconsin Black." Address: Rome, Italy.

40. Hortus Botanicus Turcomanicus (Turkmen SSR). 1937. Delectus seminum quae Hortus Botanicus Turcomanicus pro mutua commutatione offert [List of seeds offered for exchange by the Botanical Garden of the Turkmen SSR]. Ashkabad, Turkmen SSR. 32 p. 22 cm. [Lat; rus]

• ***Summary:*** Plants are listed by families in Latin. Under Leguminosae is "793. *Glycine Soja* Sieb. et Zucc." This refers to the wild soybean.

A map on the cover shows the Turkmen SSR and its capital Ashkhabad. It is bounded on the west by the Caspian Sea, and on the south by Iran and Afghanistan.

Note: This is the earliest document seen (May 2008) concerning soybeans (but only wild perennial relatives of soybeans) in the Turkmen SSR; cultivated soybeans have not yet been reported. Address: Ashkabad, Turkmen SSR.

41. Fairchild, David. 1938. Frank N. Meyer (Document part). In: D. Fairchild. 1938. The World Was My Garden: Travels of a Plant Explorer. New York, NY: Charles Scribner's Sons. xiv + 494 p. See p. 314-16, 345-46, 454-55. Assisted by Elizabeth and Alfred Kay.

• ***Summary:*** In 1905 matters of considerable moment were taking place at Fairchild's office in the Section of Foreign Seed and Plant Introduction. "A young Hollander had come to America [in Oct. 1901]. His name was Frank N. Meyer, and he had been head gardener under Hugo De Vries in Amsterdam. It seemed possible that Meyer might prove to be the man we had been looking for to send to China.

"'He's a strange fellow,' said Pieters. 'A bit erratic perhaps, for he doesn't seem to care about staying in one place. He had a letter to Erwin Smith, and Erwin gave him a job in the greenhouses, but Meyer spent all his spare time tramping around the country. He walked down to Mt. Vernon through the fields along the river, and on the way back spent the night in an old barn. Meyer told me that he heard noises around the barn and thought it must be the Indians. In fact, Meyer was surprised that he had not seen any redskins during the whole trip. Like so many European boys, he has been fascinated by James Fenimore Cooper's novels and thought the Indians still occupied the country. From Washington he went to Cuba, California and Mexico. I understand that he walked hundreds of miles in Mexico. Recently he has been at the Shaw School of Botany in St. Louis' [Missouri].

"I was much impressed with the fact that Meyer was a great walker, for I knew that there were no roads in China, and a man must either be carried in a sedan-chair or walk if he is to get anywhere throughout the interior.

"Pieters wired to Meyer to come to Washington, and I remember our first interview as plainly as though it were yesterday. It was a boiling hot day and Meyer was one of those full-blooded men who had spent his life out-of-doors and perspired freely. He cared nothing about his dress. Somewhere he had picked up a striped shirt, and when he came to see me it was wringing wet and the stripes had run. But he sat on the edge of the chair with an eagerness and quick intelligence that won me in an instant. His lack of pose, his willingness to work for any reasonable sum, and his evident passion for plants, all were evident in that first interview. Meyer told me that some of the bamboos which Mr. Lathrop and I had sent to California had been planted by a stubborn plant pathologist who did not know enough to mulch them and would not let Meyer do it either. They had died in consequence, and, as Meyer told me about it, his eyes filled with tears. From that moment Meyer and I were friends, and for thirteen years I travelled with him, in spirit if not in body, through the farms, gardens, forests and deserts of Asia.

"I was anxious to introduce Meyer to Marian's family, but he was so unconventionally dressed that I tried to spruce him up a bit before taking him there to dinner. I even presented him with a tuxedo thinking that he would need it in the Orient, but he brought it back three years afterwards and dragged it out of his trunk, green with mold. He fascinated Mr. and Mrs. Bell and all who met him by his keen interest in everything he saw, and by his eagerness to learn."

When Frank Meyer returned to San Francisco [in July 1908] from his first 3 years in China, his collection of 77 different species and varieties of plants included 18 named varieties of the soy bean, with descriptions of their characteristics and the uses to which they were put. He also had "several varieties of a small bean *(Phaseolus angularis)* used by the Chinese as a vegetable when sprouted..." "Meyer was a most economical traveler; he walked instead of being carried in a sedan chair as are most travelers in the interior of China, and he lived in Chinese inns and ate native food.

"Meyer's arrival in Washington was of course an event to be celebrated by the Office, for everybody had read his letters filled with glimpses people and customs. Marian and I gave a bonfire party at 'In the Woods' one moonlight night to which the entire Office was invited. We were none of us orators, but, with such ceremony and speeches as we were capable of, we complimented the explorer on the success of this three years of strenuous, even dangerous, plant hunting in China" (p. 345).

A great letter writer, Meyer and Fairchild became very close friends. Meyer's second trip (1909-12) was to far western China and the Caucasus. His third trip was to northwestern China; when Meyer returned from this trip, Fairchild met him in Seattle, Washington.

Pages 454-55 discuss the work and death of Frank N. Meyer. Before he left on his fourth trip to China in 1916, he wrote his will. Fairchild notes, "He often spoke of not coming back, and I always tried to stop him from thinking about death. On June 4, 1918, a cablegram came from the Consul at Nanking. It read, 'Frank Meyer, Department Agriculture, disappeared from steamer in this consular district en route Hankow to Shanghai, June 2d.' Later another cable reported that a search for his body was being made and a third cable said that it had been found thirty miles above the city of Wuhu.

"Meyer had so endeared himself to every one in the force that the shock was a very real one. While we were in our first sorrow over his death, his last letter came...

"'Concerning substitutes for dairy products,' he [Frank N. Meyer] remarked that 'the hundred and one different manufactures of the soy bean supply this protein, but I must admit that it will take some time for the white races to acquire a taste for the large majority of these products.'

"I had written Meyer that we were putting in three hundred acres of soy beans and he was much interested, as it was the largest area of this bean yet grown in America... He closed his last letter with the words 'Times certainly are sad and mad, and from a scientific standpoint, so utterly unnecessary.'

"I have always been at a loss to understand his disappearance, for no evidence of foul play was found. Meyer's death will remain a mystery to his friends. I called the members of our little staff together and we held a touching memorial meeting... Then I read them his will. He had left a thousand dollars to be spent by the office force in an outing somewhere in his honor, or, if the force so voted, it could be divided equally among all the members and, as there were a hundred, this would mean ten dollars to each person.

"It was the unanimous opinion of the Force that we should have a medal made in his honor, call it the Meyer Medal, and present it for meritorious work in the field of Plant Introduction. My old friend the medalist Theodore Spicer Simson offered to make the medal, and produced what I think is a unique and interesting one. It has already been given to ten investigators in plant introduction" (p. 455).

Photos of Frank Meyer appear on the following pages: 314B (best one, with walking stick in China), 344D, 376A, 396D, and 444C. A photo (p. 456B) shows David Fairchild presenting the Meyer Medal to Charles Torrey Simpson, with Barbour Lathrop looking on. Address: USDA.

42. Matagrin, Am. 1939. Le soja et les industries du soja: Grandeur et décadence du soja russe [Soya and soya industries: The grandeur and decadence of soya in Russia (Document part)]. Paris: Gauthier-Villars. x + 390 p. See p. 48-51. 18 cm. [Fre]

• ***Summary:*** Mr. Leon Rouest was director of the Soya Laboratory in the North Caucasus from 1930 to 1935. His various books (written in 1935 and 1936) provide very instructive documentation on soya in Russia, but in a somewhat scattered way. Our title takes inspiration from his conclusion [He described both the grandeur and the decadence] and its reach many only be temporary. The soybean was apparently cultivated since the victory over the Chechens *(Tcherkesses)* and the incursions into eastern Turkestan in about 1864. Then it was introduced into the Ukraine and Bessarabia [Romania], either from the Caucasus or from Hungary in the following years. It finally became better known when the construction of the Trans-Siberian railway led the Russians into Manchuria (1896-1904).

Note: After the Russian Revolution of 1917, on 20 Jan. 1921 Chechnya and Ingushetia joined the Soviet Mountain Republic. On 30 Nov. 1922 the Chechen Autonomous Oblast of RSFSR was separated. On 7 July 1924 the Ingush Autonomous Oblast of RSFSR was separated. On 15 Jan. 1944 they were joined into the Chechen-Ingush Autonomous Oblast of RSFSR, which was reorganized into Chechen-Ingush Autonomous Soviet Socialist Republic (ASSR) of RSFSR on 5 Dec. 1936; its capital was Grozny. In Nov. 1990, the republic declared its sovereignty and in May 1991 an independent Chechen-Ingush Republic was declared; it was subsequently divided into the independent Chechen Republic and the Republic of Ingushetia. Since that time, Russia has fought two wars to try to prevent Chenchen independence.

The soybean, a remarkable agent of fertilization and a food that can be stored in anticipation of hard times / famines, could not fail to interest the Soviet government to the highest degree.

Before the universal success of the soybean after World War I, it was seen not only as an interior resource, but also as an export crop. However in 1931, of the 5,970,000 ha in Russia used to grow oilseeds, less than 1,100 ha were used to grow soybeans versus 5,200,000 for sunflowers, 300,000 for castor oil, 140,000 for sesame, 30,000 for peanuts, and 350,000 for others such a linseed, rapeseed, etc. But already Soviet industry began to demand soybeans. A large furniture factory in the region of Oklanskaia made glues from vegetable proteins. The oil was studied for use in soaps and paints. The famine that threatened the working people, because the *moujiks* resisted the conversion of their lands into collective farms, was able to be prevented or delayed by progress in soybean cultivation. Also the 5-Year Plan foresaw the expansion of the crop to 3-5 million ha with harvests of at least 1,500 kg/ha.

To guide the farmers and perfect management techniques, a lab was organized, specialists and selectors of plants (including women) were recruited, and finally, because the relationship with Germany had not yet soured because of the Russian's military accord with France, the Germans were granted concessions in different regions (of Russia). Otherwise how could the USSR have harvested a 1935 crop of about 1 million quintals (100,000 metric tons)? The number is enormous by comparison with the rest of Europe. Note: 1 quintal = 100 kg.

Here, according to the agronomist Rouest, are the causes of the Russian setback. 1. The negligence and ignorance of the Russian peasants. 2. The disadvantages of the Communist regime. 3. The general ideological method, always hard to reconcile with the needs and uncertainties of agriculture (e.g. research to find varieties suited to the use of large harvesters). 4. Poorly chosen cultural methods. 5. Use of most of the harvest for food. The best literature concerns the *moujik* peasants. One long study of 1911, of which we have a copy, was written by a Russian doctor. Sowed in the black soil of the Caucasus and Ukraine, the soybeans, said Rouest, evidently saved the lives of thousands of people.

We are told that the Russians are disgusted with the compulsory use of soybeans, the results of unskilled cooks, etc. Address: France.

43. Matagrin, Am. 1939. Le soja et les industries du soja: Asie occidentale [Soya and soya industries: In Western Asia (Document part)]. Paris: Gauthier-Villars. x + 390 p. See p. 57. 18 cm. [Fre]

• ***Summary:*** "Western Asia–Only a few permanent crops are mentioned, already there for a long time or propagated by the Russians, in the plains of Turkestan [see p. 48], and of trials, conducted rather out of curiosity, in Persia."

Note 1. This is the earliest document seen (May 2008) that clearly refers to soybeans in Persia, or the cultivation of soybeans in Persia [renamed Iran in 1935]. Unfortunately, only the very brief statement quoted above is given.

Note 2. Turkistan or Turkistan is an historical region of central Asia, usually thought to comprise Turkmenistan, Uzbekistan, Kyrgyzstan, Tajikistan, southern Kazakhstan, western China, and northeastern Afghanistan. Notice that it does not include today's Turkey. Address: France.

44. Matagrin, Am. 1939. Le soja et les industries du soja: Produits alimentaires, huile de soja, lécithine végétale, caséine végétale [Soya and soya industries: Food products, soy oil, vegetable lecithin, and vegetable casein]. Paris: Gauthier-Villars. x + 390 p. 18 cm. [300 ref. Fre]

• ***Summary:*** Contents: Introduction. 1. The agricultural, industrial, and commercial history of soya: Asiatic origins and propagation in Europe, soya in America (its cultivation and industries), soya in Europe, Asia, Africa, and Oceania (1936) (1. Admission of soya in the agriculture and industry of European nations (p. 35): Soya in France, soy industry and commerce in central and northern Europe {England, Germany, Holland, Denmark, Sweden, Poland, Austria and

Hungary, Switzerland}, penetration of soya into southern Europe {Iberian peninsula, Italy, Balkan countries of Dalmatia, Istria, Yugoslavia, Greece (p. 47), Bulgaria, Romania, Ukraine}, the grandeur and decadence of soya in Russia. 2. Soya in modern Asia (p. 51): China and Manchuria, Japan, Korea, Formosa, French Indochina {Tonkin, Cambodia, Cochin China}, the British and Dutch Indies {Siam, Assam, Bengal, Burma, Ceylon, India, Straits Settlements [later Singapore] / Malacca}, western Asia {Turkestan, Persia (p. 57)}. 3. Soya in Africa and Australia (p. 57-58): South Africa, Rhodesia, Nigeria, Gold Coast [later Ghana], Cote d'Ivoire, Dahomey, Togo, Algeria, Tunisia, Morocco, Egypt, Australia {Queensland, New South Wales, Victoria}, Tasmania, New Zealand, not yet in British New Guinea [later Papua New Guinea], Philippines, Java).

2. The botany and agronomy of soya: The plant, its names, its botanical characteristics, its varieties (original and created by selection), the cultivation of soya. 3. The general chemistry of soya: Chemical composition of the plant, structure and chemical composition of the beans. 4. Using soya in soyfoods and soyfood products: Whole soybeans (fresh, dry, sprouted, roasted and salted *(Fève grillée, fève salée de soja, fèves de soja salées,* p. 166-67), soynut butter *(un mélange rappelant les beurres végétaux),* soy coffee, soy confections, soy chocolate, soy sprouts), soymilk and tofu *(le lait et le fromage de soja),* okara *(pulpe résiduaire de la préparation du lait de soja),* fermented soy products (solid, paste, and liquid condiments; natto, miso, and shoyu [soy sauce]; kiu-tsee and lactic ferments), soy flour and bread. 5. The soy oil industry and products derived from it: Extraction and refining of soy oil, properties and use of soy oil. 6. The vegetable lecithin industry: Extraction of vegetable lecithin, properties and use of vegetable lecithin. 7. The vegetable casein industries and plastic materials based on soya: Soybean cakes and flours from which the oil has been removed, use of such cakes and flours, in the crude state, as a raw material for plastics, manufacture and use of vegetable protein, soybean cellulose for artificial silk, soya furfural and furfuraldehyde (phenolic resins). Conclusion: How to launch soya industries in France. important terms:

Note 1. This is the earliest French-language document seen that uses the terms *Fève grillée, fève salée de soja,* or *fèves de soja salées,* "roasted soy beans" to refer to soynuts.

Note 2. This is the earliest French-language document seen (April 2005) that mentions soynut butter, which it calls *un mélange rappelant les beurres végétaux.* Address: France.

45. Fallon, F. (Baron). 1941. Le soja [The soybean]. *Belgique. Ministere des Colonies. Direction Generale de l'Agriculture et de l'Elevage. Propagande et Vulgarisation Agricoles* No. 21. 39 p. Bruxelles: Impr. Industrielle et Financiere. [17 ref. Fre]

• ***Summary:*** Contents: Botanical description: Introduction, the plant's needs, varieties. Soybean cultivation in Europe: Introduction (for some countries preferred early, medium, and late varieties are listed), France, Great Britain, Hungary, Poland (selection has been done at the Wilna experiment station using varieties imported from Hungary and Czechoslovakia), Romania (About 30,000 ha are devoted to soybeans, primarily in Bessarabia [Besarabia], Dobrouja [Dobrudja, Dobrogea], Bukovina [Bucovina], Walachia or Wallachia or Valachia [now called Muntenia, a fertile belt across southern Romania], and Moldavia. Most of these varieties came from Austria), Switzerland, USSR (the main soybean regions are all warm ones–the Caucasus, Ukraine, and Transcaucasia). Soybean cultivation in America. Soybean cultivation in Africa (especially in South Africa, mainly for forage in the Natal and Transvaal). Soybean cultivation in Asia: China and Manchuria, Malaysia, British Indies, Dutch Indies, Indochina, Japan. Soybean cultivation in Oceania (mainly Philippines).

Cultivation: Crop rotation, inoculation, planting and propagation, maintenance and manuring the land, harvest, seed storage, yield, selection of varieties. Soybean utilization: As human food (dry soybeans, soy sauce, soy flour, soymilk, tofu, soy oil), industrial uses (soy oil, refining and use, soymilk casein). Soya as a fertilizer: Green manure, or soybean cakes. Soya as a feed for domestic animals: Green forage, hay, silage, pasture, seeds, cakes. Soybean cultivation in the Belgian Congo. Soybean trade.

In the Congo various soybean trials have been undertaken since 1936 at the stations of the National Institute for Agronomic Study of the Belgian Congo (l'Institut National pour l'Etude agronomique du Congo Belge). Numerous varieties from the USA and Manchuria have been tested. Address: Directeur au Ministere des Colonies, Professeur a l'Institut Agronomique de Gembloux [Belgium].

46. *Selektsiia i Semenovodstvo (Moscow).*1946. Karabalyskaia gosselekstantsiia (informatsiia) [Karabalyk State Breeding Station (information)]. No. 6. p. 77-78. June. [Rus]

• ***Summary:*** The Karabalyak State Breeding Station was established in 1938 in the province of Kustanai (Kustanai / Qostanay Oblast, a subdivision of the Kazakh S.S.R.; the capital is Kustanai) amidst open steppes [in the north central part of the country]. The climate is continental. There is little rain, the summers are short and hot, the winds are strong, and the soil in some parts is saline. They have started to adapt and produce new crops for this region: maize, sugar beets, soybeans, safflower, and others. From local populations, new lines and types of wheat were produced... plants capable of high yields in virgin lands and

hard fallowland (according to a study by F.M. Mashtakov / Mashgakov and L.V. Pamenova).

Note: Talk with the Commercial Attaché at the Kazakhstan Embassy in Washington, DC. 1996. June 4. The Karabalyak State Plant Breeding Station apparently no longer exists. One good source of information is the Ministry of Agriculture, 480065 Republic Square 15, Almaty, Kazakhstan. Fax: +7327 2 631377.

A map of north-central Kazakhstan shows: Kustanai (Qostanay, Kustanay) Oblast (administrative division to west), Kokchetav Oblast (administrative division to east), and Severo-Kazakhstanskaia Oblast (north Kazakh administrative division to the north). Address: Kazakh S.S.R.

47. Ryzhikov, Nikolai. 1947. Utilization and cultivation of soybeans in the U.S.S.R. *Soybean Digest.* Oct. p. 12.
• ***Summary:*** Before the Russian Revolution of 1917, the soybean was cultivated in only small areas of the Soviet Far East. But after the establishment of Soviet rule, the soybean began to be planted over larger areas.

Before World War II "there were large soya plantations on the collective farms of the Ukraine, Georgia and North Caucasus, while in the main soya-growing districts of the Soviet Far East the plantations increased in size four times between 1926 and 1943, and many times more in Khabarovsk territory."

The war inflicted great damage on the USSR and its crops. "The areas sown to soya in the Ukraine, North Caucasus and Moldavia decreased considerably as a result of the war and the temporary occupation. In the Ukranian SSR these plantations decreased by 80 percent, in the North Caucasus by 83 percent and in Moldavia by 77 percent.

"With the coming of peace the cultivation of industrial crops was recommenced immediately. By a decision of the Soviet government, the area sown to soya is to be increased by 52,000 hectares this year in order that next year the plantations be brought up to prewar level. In the Soviet Far East, where soya is one of the chief industrial crops grown, it will cover 20 percent of the entire area in some districts. The propagation of early-ripening varieties of soya is of great importance from the point of view of advancing this crop further north."

The soybean varieties most widely propagated in the USSR are the Amurskaya Zheltaya 041 and 042 (developed at the Amur Selection station), Ussuriiskaya 029, Staroukrainskaya, Kharkovskaya 149, Kharbinskaya 231-a, and Kubanskaya 276. Grown in different regions of the USSR, all these varieties are distinguished by their high crop yield and rich albumen [protein] and fat content. On the large farms of the Soviet Union, soya is generally sown by tractor-drawn grain seeders and cultivation is done by tractors. Only weeding is done by hand. Soya is chiefly harvested by combines especially equipped for this purpose. Soybeans are bred so that the lowest beans grow at least 12-15 cm from the ground.

In 1947, 20% of the actual sown areas was set aside for seed, thus ensuring an adequate supply of high grade seeds. On leading farms the yield is over 30 centners per hectare. Note: One centner in the USSR is 220.46 lb. "Even last year, when meteorological conditions were highly unfavorable, the May 1st Collective Farm in Khabarovsk territory grew a crop yield of 30.6 centners per hectare." They hope for a yield of 45 centners/ha this season.

"The All-Union Research Institute of Soya and Castor-Oil Plants has carried out a great deal of work connected with the adaptation of the existing combines for soya harvesting..."

"Soya has many varied uses in the national economy. Numerous food-stuffs are made with it, while its refined products are widely used in the aviation, automobile, rubber, lacquer and dyes, butter, soap and casein industries." Fodder varieties and concentrates made of soya waste are widely used on livestock farms. A photo shows many workers threshing grain on a Russian farm. Address: Head of the dep. of soya and castor-oil plants in the Ministry of Agriculture, USSR.

48. *Field Crop Abstracts.*1948. Plant breeding (Abstract). March. p. 126 (Abst. #670). [1 ref]
• ***Summary:*** An English-language summary of the following Russian-language article: *Selektsiia i Semenovodstvo* (Moscow). 1946. Karabalyskaia gosselekstantsiia (informatsiia) [Karabalyk State Breeding Station (information)]. No. 6. p. 77-78. June.

49. Popovski, Vladimir. 1949. Cultivation of soybeans in Romania. *Soybean Digest.* Nov. p. 32-33. [8 ref]
• ***Summary:*** "In the early 1930's, the effects of the world [economic] crisis were felt very sharply by the agriculture of Bessarabia (in Romania) where I owned a farm. The high income of farming, characteristic of the first decade following the war, was gone." The prices of all grain crops except clover dropped to such an extent that the costs of production were not covered.

"In the middle 1930's, when prices of grain were somewhat higher, the Soybean Co. opened its offices in Romania. The company offered the farmers the cultivation of soybeans on the following conditions: the company would lend the seed, and the farmer would cultivate the soybeans under the supervision of the company's instructors. The farmer agreed to deliver the entire harvest of soybeans to the company for a price specified in the contract. The price offered by the company was approximately 70 percent higher than the price of wheat prevailing at that time.

"Soybeans were absolutely unknown at that time. During the first year only a few farmers signed contracts

with the company and started to experiment with their cultivation. The experiments proved successful, inasmuch as the yield of the soybean crops was equal to that of wheat, and their value was almost double that of wheat.

"The area devoted to soybeans grew steadily every year, especially in Bessarabia where agriculture was on a much higher level than in Romania. During the first year, a few hundred acres were planted with soybeans in northern Bessarabia [in today's Moldova], but by 1940 hundreds of thousands of acres were planted. Bessarabia offered very favorable conditions for the successful cultivation of soybeans, such as a climate with sufficient rainfall during the period of vegetation, and an abundance of comparatively cheap labor."

The author cultivated soybeans for 7 years on what was, by Bessarabian standards, a relatively large farm of 250 acres. During his third year in cultivation, he obtained a yield of 3,000 kg/ha (40.5 bu/acre). The entire harvest of soybeans grown in Romania was sent to Germany, since there were no plants in Romania for processing soybeans or using them as a raw material.

Then twice during World War II, in 1940 and again in 1944, he had to flee before the advancing Communists. Many larger farmers who did not flee were captured, and branded as "kulaks" [wealthy peasant farmers]. The men were sent to Siberia and the women and children to Kasakhstan [Kazakhstan]. Only after he had crossed Germany did he realize what an amazing number of food, feed, and industrial products could be manufactured from soybeans. A portrait photo shows Popovski.

Note: This document may contain the earliest date seen for soybeans in Moldova, or the cultivation of soybeans in Moldova (1938 or 1939). The source of these soybeans is unknown. Unfortunately the author does not state clearly in what year he first started growing soybeans in northern Bessarabia. Address: Factory worker, New York City.

50. Generalov, G.F. 1949. Soderzhanie belka i zhira u sortov soi [Content of protein and fat in soybean varieties]. *Selektsiia i Semenovodstvo* No. 4. p. 50-53. [11 ref. Rus]
• ***Summary:*** Analysis of the chemical composition of soybeans seeds harvested in various years from 1938 to 1947 was conducted. Varieties grown in the Ukranian SSR and in Transcaucasia have a high protein content. Varieties having the highest fat [oil] content are those grown in the Taldy Kurgan province [Oblast, in the East Kazakh SSR southeast of Lake Balkhash and about 140 miles northeast of Alma-Ata], in the north Caucasus, and in the central part of western Georgia. Address: State Commissariat for Varietal Trials of Grain Crops.

51. Chckenkeli, N.I. 1950. [Definition of grain legumes]. Tblisi, Georgia. 67 p. [Geo]
• ***Summary:*** The section titled "Soya–Glycine L." (p. 24-35) has the following contents: Introduction. Definition of landraces. Definition of diversity. List of varieties and sub-varieties with old-fashioned names based on seed color (such as Proles grandifolia, var. rufo-xanthodes, albo-sublutea, etc.). Modern list of 40 varieties.

The introduction begins: "The soybean was introduced to Georgia in the 1860s."

52. Anthony Bros. Inc. 1951. The Bar-B-Q Chef (Ad). *Los Angeles Times.* April 22. p. G21.
• ***Summary:*** "Shish kebab is Armenian, Shashlik is Russian, en Brochett is French, and Teri Yaki is Hawaiian. They all spell delicious barbecued food." A recipe for Shashlik (but not Teri Yaki) is given.

A clip-out coupon offers two choices: (1) "Please send me your Free Bar-B-Q Recipe pamphlet." (2) "Please send me an invitation to your barbecue demonstration." Note: The company sells barbecue equipment. Address: 270 S. Rosemead Blvd., Pasadena [California].

53. Hortus Botanicus Academiae Scientiarum RSS Armeniae (Botanical Gardens, Armenia). 1958. Delectus seminum quae Hortus Botanicus Instituti Botanici Academiae Scientiarum RSS Armeniae Pro Mutua Commutatione Offert XXII. [Index of seeds]. Epebah, Armenia. 56 p. 26 cm. [Lat; Rus]
• ***Summary:*** Plants are listed by broad categories in two columns, the left one in Latin, the right in Russian. In section 4, *Plantae cerealia* (Cereal plants, by A.A. Avakjan; p. 43), plants (including legumes) are listed alphabetically by genus. Seven varieties of "Glycine hispida (Moench) Maxim" are listed (p. 43), but the variety names are given only in Russian.

Note: This is the earliest document seen (June 2004) concerning soybeans in Armenia, or the cultivation of soybeans in Armenia. Address: Yerevan (Epebah), Kanaker, Armenia.

54. Japaridze, A. 1960. [Soya]. Tblisi, Georgia. 64 p. 20 cm. [Geo]
• ***Summary:*** Page 3 states: In Europe, the soybean was first cultivated in France in 1779; in the USA it was first cultivated in 1804.

Page 5 states that in 1882 many soybean varieties were introduced to Georgia from Japan. But the first soybeans were introduced to Georgia in the 1860s. Address: Georgia.

55. Ragimov, A.S. 1961. [The influence on different methods of sowing soyabean on the formation of root nodules]. *Izvestiia Akademii Nauk Azerbaidzhanskoi SSR (Bulletin of the Academy of Sciences of Azerbaidzhan SSR) Ser. Biol. and Med. Sci* No. 3. p. 37-40. Russian translation. [5 ref. Ser]

56. Ragimov, A.S. 1961. Vlijanije sposobov poseva na biologiceskije osobenosti i urozajnost soji [The effect of methods of sowing on the biological peculiarities and yield capacity of soybeans]. *Izvestiia Akademii Nauk Azerbaidzhanskoi SSR (Bulletin of the Academy of Sciences of Azerbaidzhan SSR) Ser. Biol. and Med. Sci. Izvestiia Akademii Nauk Azerbaidzhanskoi SSR (Bulletin of the Academy of Sciences of Azerbaidzhan SSR)* No. 1. p. 33-45. Russian translation. [10 ref. Ser]
• ***Summary:*** Note: This is the earliest document seen (April 2008) concerning soybeans in Azerbaijan, or the cultivation of soybeans in Azerbaijan.

57. Hortus Botanicus Alma-Atensis Academiae Scientiarum KazSSR. 1961. Index seminum quae Hortus Botanicus Alma-Atensis Academiae Scientiarum KazSSR pro mutua commutatione offert 26 [List of seeds offered for exchange by the Botanical Garden of the Scientific Academy at Alma-Ata, Kazakh SSR, No. 26]. Alma-Ata, Kazakhstan. 112 p. 21 cm. [Lat; Rus]
• ***Summary:*** Plants are listed by families in two columns, the left one in Latin, the right in Russian. Under Leguminosae are two varieties of "Glycine hispida Moench." (nos. 1441 and 1442). The variety names are given only in Russian. Address: Alma-Ata 10, Kazakhstan.

58. Tedoradze, S. 1963. [Soya]. Tblisi, Georgia: State Press. 76 p. 20 cm. [Geo]
• ***Summary:*** Page 1 states: Soybeans were cultivated in Armenia in 1930, and in Azerbaidjan in 1931.

Page 6 states: In 1882 G. Sturua (a Georgian statesman) gave some soybean varieties to the Caucasus Agricultural Society; he obtained these from his brother in Japan.

Page 7 states: In 1898, Georgia has many landraces and varieties of soybeans. Professor L. Dekabrelevich wrote that the soybean was introduced to Georgia during the 1860s or 1870s.

Note 1. This document contains the earliest date seen for soybeans in Armenia, or the cultivation of soybeans in Armenia (1930). The source of these soybeans is unknown.

Note 2. This document contains the earliest date seen for soybeans in Azerbaijan, or the cultivation of soybeans in Azerbaijan (1931). The source of these soybeans is unknown. Address: Georgia.

59. Bakaeva, Ekaterina Vasil'evna; Chernogolovin, V.P. 1963. Soia v Kazakhstane [Soybeans in Kazakhstan]. Alma-Ata, Kazakh SSR: Kazakhskoe Gosudarstvennoe Izdatel'stvo Selkhoz Literatury (Soviet National Agricultural Publishing Co.). 35 p. [Rus]
• ***Summary:*** In Kazakhstan, soybeans began to be cultivated in the 1930s. But because of an absence of early-maturing varieties and because the crop was very labor-intensive, plans to increase production were curtailed. Cultivation of soybeans in Kazakhstan was expanded considerably during 1961-62 in accordance with government policy.

Kazakhstan is the second largest Soviet republic (after Russia), and the largest of the five Central Asian Republics. Admitted to the USSR as a constituent republic in 1936, its capital is Alma-Ata. Address: USSR.

60. Qoryunov, N.S.; Orgyzkova, N.I. 1964. Fiziologicheskaya otsenka rezhima orosheniya soi [A physiological appraisal of irrigation conditions for soya]. *Fiziologiia Rastenii (Physiology of Plants) (Moscow)* 11(6):1090-94. Nov/Dec. [4 ref. Rus; eng]
• ***Summary:*** The best time to irrigate soybeans was determined from critical values of cell-sap concentrations in leaves about half way up the plant. Physiological characteristics were favorable and crop yields were high when the rhizosphere was maintained at not less than 80% of field capacity during growth.

Note: Dzhambul (formerly Aulie Ata) is a town and the capital of Dzhambul Oblast, in the southeast Kazakh SSR on the Turkistan-Siberian Railroad, 130 miles northeast of Tashkent. Address: Kasakh [Kazakh] Scientific Research Inst. of Irrigation, Dzhambul, Kazakh SSR.

61. Baitulin, I.O. 1965. [Root systems of some field crops in the Dzhurun desert-steppe]. *Izv. Akad Nauk SSR (Ser. Biol. Nauk)* No. 1. p. 79-83. [5 ref. Rus]*
• ***Summary:*** Weight and total length of roots in each 10-cm later of soil was determined for various crops, including soybeans. The deepest root penetration (110 cm) was recorded for wheat and the shallowest (70 cm) for peas. Beans and peas had the smallest weight of roots in the top 30 cm of soil. Address: Kazakhstan.

62. Zhailibaev, K.N.; Khasenov, E. Kh. 1966. O formirovanii i produktivnosti raboty fotosinteticheskogo apparata soi pri ralichnom rezhime orosheniya [On the formation and productivity of the photosynthetic apparatus of soya under various irrigation conditions]. *Fiziologiia Rastenii (Physiology of Plants) (Moscow)* 13(1):165-68. Jan/Feb. [17 ref. Rus]
Address: Kazakh Research Inst. of Agriculture, Politotdel.

63. Chailakhyan, M. Kh.; Kaladzhyan, N.L. 1970. [Effects of *Rhizobium* inoculation on the contents of growth regulators in leguminous plants]. *Biologicheskii Zhurnal Armenii (Biological J. of Armenia)* 23(4):14-26. [10 ref. Rus; arm]*
• ***Summary:*** One group of soybean plants and of common bean *(Phaseolus vulgaris)* plants were inoculated with effective strains of *Rhizobium;* a second group was not inoculated. The leaves and roots of the plants in the inoculated group contained several gibberellins and

gibberellin-like substances in larger quantities than were found in the leaves and roots of the uninoculated group. Gibberellin A-3 was found in the leaves and roots of the inoculated group, but not of the uninoculated group. Other growth regulators were also found. Growth stimulators were more abundant in the leaves and roots of the inoculated than of the uninoculated group, whereas the opposite was observed for growth inhibitors. Address: Institut Mikrobiologii, Akad. Nauk Arm. SSR, Erevan, Armenian SSR.

64. Kosolapova, G. ya.; Yakovleva, V.M. 1971. [The bean Bruchid in Kazakhstan]. *Zashchita Rastenii, Moskva (Plant Protection, Moscow)* 16(11):42. [Rus]
• ***Summary:*** The caged larva of the bean Bruchid *(Acanthoscelides obtectus)* infested soybeans.

65. Tskhakaya, K.E.; Tskhadaya, E.T. 1972. [Changes in carbohydrate contents in soyabean seeds as affected by trace elements]. *Tbilisie Universitetis Shromebi* No. A5(147). p. 155-58. [Geo; rus]*
Address: Universitet, Tbilisi, Georgian SSR.

66. Bakaeva, E.V.; Mazunina, V.I. 1972. [Resistance of soybean varieties to diseases in the Alma-Ata area]. *Auyl Saruasylyk Gylymynyn Habarsysy* No. 9. p. 30-35. [Rus]*
• ***Summary:*** Resistance to Pseudomonas and mosaic virus was found in the recommended variety Vysokostebel'naya 2 [Tall-stemmed 2] and in Vysokostebel'naya and Piramidal'naya [Pyramidal]. Address: Alma-Ata, Kazakh, SSR.

67. Chernogolovin, V.P.; Bakaeva, E.V. 1972. [Tall soyabean cultivars, their productivity and methods for their cultivation on irrigated lands in S.E. Kazakhstan]. *Nauchnye Trudy, Kazakhskii Sel'skokhozyaistvennyi Institut* 15(2):107-16. [Rus]*
• ***Summary:*** Describes the agronomic characters of tall soybean cultivars, and gives the results of trials during several years, on their seed yield response to cultivation techniques and fertilizers on irrigated lands in southeastern Kazakhstan. Address: Sel'khozinstitut, Alma-Ata, Kazakh, SSR.

68. Kuznetsova, A.A.; Muradov, K.M.; Kazantseva, V.N. 1972. Khimicheskii sostav nekotorykh zernovykh bobovykh kul'tur, perspektivnykh dlya vozdelyvaniya v Turkmenskoi SSR [Chemical composition of some legumes, prospective for cultivation in Turkmen SSR]. *Izvestiia Akademii Nauk Turkmenskoi SSR, Seriia Biologicheskikh Nauk (Proceedings of the Academy of Sciences of the Turkmen SSR, Biological Sciences Series)* No. 5. p. 47-50. [5 ref. Rus; tum; eng]
• ***Summary:*** *Vigna, Dolichos,* soybeans, and jack beans are fodder crops in Turkmenistan. Data on seed yields and seed contents of protein, starch, moisture, phosphorus, potassium, and calcium are given for these legumes which were introduced in 1968-69 into the Turkmen SSR. The chemical composition of the green matter and seeds of the crops is strongly influenced by the phenological rhythm of development. The largest amounts of protein (25.0–33.7%) accumulate at the beginning of flowering.

Table 1, titled "Nitrogen content of the seeds of various beans (% of dry matter): Experiments in 1968-69" (p. 48) contains six columns: Species and varieties, yield, nitrogen content (average), albuminous nitrogen, non-albuminous nitrogen, protein (N x 6.25). The soybean varieties tested were: Ogden, Ito-San, Shelbi, Urumchi. Ito-San gave the highest yield in both years (2,280 kg/ha and 2,830 kg/ha).

Table 2, titled "Protein content of the green mass of various plants corresponding to stages of development," (p. 48) contains three columns for stages of development: Beginning of flowering, full bloom and beginning of bean formation, and beans fully grown. Figures are given for the Ogden and Ito-San soybean varieties.

Table 3, titled "Chemical composition of the ash of different varieties of bean seeds" (p. 49) gives figures for moisture, total ash, and 3 minerals.

Table 4, titled "Seed yield, protein yield, and in 1968 and 1969 for four soybean varieties: Ogden, Ito-San, Shelbi, and Urumchi.

Note 1. Ashkhabad, formerly Poltoratsk, is the capital of the Turkmen SSR. It is located near the Iran border in a fertile oasis.

Note 2. This is the earliest document seen (April 2008) concerning soybeans in the Turkmen SSR (Turkmenistan), or the cultivation of soybeans in Turkmenistan. This document contains the earliest date seen for soybeans in Turkmenistan, or the cultivation of soybeans in Turkmenistan (1968). The source of these soybeans is unknown.

Note 3. Reference 2 is titled "Cultivation of bean seeds in the south of the republic," published in *Agriculture in Turkmenistan* (1968). Reference 5 is titled "Content and quality of protein and bean seeds," published in *Vestnik Sel'skokhozyaistvennoi Nauki (Journal of Agricultural Science, Moscow)* (1962). Address: Institut Botaniki [Inst. of Botanical Sciences], Akademii Nauk Turkmenskoi SSR, Ashkhabad, Turkmen, SSR.

69. Boiko, A.; Karyagin, Yu. 1973. Tri kul'tivatsii + prometrin pered posevom [Three cultivations + prometryne before sowing]. *Zemledelie (Agriculture, USSR)* No. 5. p. 33. May 5. [Rus]
• ***Summary:*** In soybean trials in 1969-1972, three pre-planting cultivations combined with 2 kg prometryne (as is) per hectare before emergence decreased weed populations

by 30.7% and their weight by 54.8%, compared with 3 cultivations alone, and resulted in average seed yields of 1.18 tonnes/ha, compared with 1.1, 0.94, and 0.79 tonnes/ha on plots given 3, 2, and 1 cultivation, respectively. Seed protein contents were 41, 39, and 37.6%, respectively. Address: 1. Head Agronomist, Lenin State Farm in Alma Ata; 2. Candidate/Member in Agricultural Science, Kazakh Research Inst. of Agriculture (Institut Zemledelie). Both: Kazakh, SSR.

70. Chailakhyan, M. Kh.; Arutyunyan, R. Sh.; Stepanyan, M.D.; KArapetyan, N.A. 1973. [Effect of the growth retardant CCC on the growth of leguminous plants and nodule formation under different methods of application]. *Doklady Akademii Nauk Armyanskoi SSR* 56(3):182-87. [16 ref. Rus; arm]*
• ***Summary:*** Soil application of 0.5-2.0% of chlormequat (a growth regulator) solutions, decreased the height and weight of plants, and the number and weight of nodules in soybeans and common beans *(Phaseolus vulgaris).* Address: Institut Mikrobiologii Akademii Nauk Armyanskoi SSR, Erevan, Armenian SSR.

71. Ivanov, Yu. M. 1973. Sravnitel'naya soleustoichivost' zernovykh zernobobovykh kul'tur i ikh sortov razlichnogo ekologogeograficheskogo poiskhozhdeniya i metody ikh diagnostiki [Comparative salt tolerance of cereals, legumes and their varieties of different ecological and geographical origins and methods for diagnosing them]. In: D.K. Saidov, R.A. Azimov, and T.B. Soklova, eds. 1973. Voprosy Soleustoichivosti Rastenii: Materialy Vsesoiuznoi [Problems in Salt-Tolerance of Plants]. Tashkent, Uzbek SSR: Fan. Akademia Nauk UzSST, Institut Experimental'noi. Vsesoiuznaia Konferentsiia po Soleustoichivosti Rastenii. 460 p. See p. 296-307. Illust. 22 cm. [12 ref. Rus]
• ***Summary:*** In pot trials, 300 cultivars of field crops were grown in the Uzbek SSR at iso-osmotic concentrations of NaCl (common salt) and sodium sulfate to determine their salt tolerance. Barley was the most tolerant to salt, followed by wheat, oats, sorghum, maize, and chickpeas in that descending order of tolerance. Soybeans were the least tolerant, slightly less than cowpeas, peas, and vetch in that ascending order of tolerance. NaCl decreased the productivity of these plants more than did sodium sulfate.

Note: This is the earliest document seen (May 2008) concerning soybeans in Uzbekistan, or the cultivation of soybeans in Uzbekistan.

72. Saakyan, R.A. 1973. [A comparative investigation of legumes grow in the Aparansk region of the Armenian SSR]. *Tekhekagir Gyukhatntesakan Gitutyunner* No. 8. p. 52-58. [Arm]*
• ***Summary:*** In trials in the Armenian SSR in 1971-72 six fodder plants, including soybeans, harvested at the seed-formation stage, gave higher yields of fresh fodder, feed units [FU], and digestible crude protein [DCP] than when harvested at the flowering stage; *Lathyrus sativus* (Lathyrus pea / chickling vetch) gave the highest yields.

73. Gadzhiev, O. 1973. Uplotnenie posevov sorgo [Mixed sowing of sorghum]. *Zemledelie (Agriculture, USSR)* No. 4. p. 50-51. [Rus]
• ***Summary:*** In 1969-71 irrigated trials with sorghum were conducted in the Azerbaidzhan [Azerbaijan] SSR. Sowing sorghum in mixtures with soybeans gave yields of 68.66 tonnes/ha, compared with 51.83 tonnes/ha in pure stands. The yield form the mixture with soybeans was higher than in mixtures with Sudan grass (62.73), maize (62.1), vetch (58.18), cowpeas (62.76), fodder peas *(Pisum arvense,* 61; also called field pea), or peavine *(Lathyrus* species, 60.73). Address: Sel'skokhozyaistvennyi, Institut, Baku, Azerbaidzhan SSR.

74. Wood, R. Bruce. comp. 1974. Soviet soybean varieties: An annotated bibliography. Urbana, Illinois. 187 p. Photocopied from 5 x 8-inch typed file cards. [20 ref. Eng]
• ***Summary:*** Chapters are divided by regions. A history of the named regional varieties developed is given, along with the source of the germplasm, the name of the plant breeder(s), and the organization with which he or she worked, a description of the plant (incl. morphology, maturity, composition, seed weight {weight of 1000 seeds}, yield), citations for the source of the above information, and in some cases a translation and/or explanation of the name in English. Amur region (Amur Oblast and Khabarovsk Kray) grain varieties and fodder varieties (p. 1-27). Maritime (Primorskiy) Kray grain and fodder varieties (p. 28-36). Central Asian fodder varieties (p. 37-38). Georgian grain varieties (p. 38). North Caucasian grain varieties (p. 48-54). Ukranian grain varieties (p. 55-64). Moldavian grain varieties (p. 65-68). Prospective varieties and/or those undergoing trials (p. 68-154). Baltic varieties (Latvia and Lithuania; p. 154-64). Varieties of undetermined origin (p. 164-).

Page 1 states that a number of varieties were developed at the "former Amur Oblast State Agricultural Experiment Station in Blagoveshchensk, now the All-Union Scientific Research Institute of Soy." Many of the stock plants were chosen during the period from 1930 to 1939. Page 43 notes: "Imeretinskaya (mestnaya): This old-variety population is one of three major ecologic types grown for more than 90 years [i.e. since 1884 or before] in the Georgian SSR. (The other two variety populations are Guriyskaya and Chiaturskaya.) This material was originally imported from China, Korea, and Japan. Attempts were made during the 1st Five-Year Plan (1928-32), when the USSR first began to

cultivate soy on a large scale, to subject these local populations to the selection process in order to develop purer lines with stable and more desirable characteristics. These were then used for hybridization. According to Enken (1971, 125), these crosses did not yield positive results. The breeders were apparently successful, however, in developing purer strains of the local material, for Imeretinskaya mestnaya was in commercial production by 1930 (Vul'fson, 1935, 59), and first regionalized for the Georgian SSR in 1933 (Generalov, 1968, 146). As such it was one of the first Soviet domestic soy varieties, and one of several original varieties still having regional status after more than 40 years."

The Amur Oblast State Agricultural Experiment Station was organized in 1923-24. "The Amur Yellow Population should not be confused with the soy population used by the pre-Revolutionary Amur Experiment Station in 1912-18, which had a different composition."

Page 188 shows the leading Soviet soybean varieties in 1970, ranked by sown acreage: Salyut 216, Amur region, 346,900 ha (hectares). Khabarovskaya 4, Amur region, 141,267 ha. Amurskaya 41, Amur region, 100,995 ha. Primorskaya 494, Maritime Kray, 76,191 ha. Primorskaya 529, Maritime Kray, 65,233 ha. Primorskaya 762, Maritime Kray, 21,300 ha. Amurskaya 310, Amur region, 18,321 ha. Yubileynaya, Amur region, 14,755 ha.

Table 2 lists the names of all soybean varieties entered in the 1962-69 state variety trials, together with the organization that developed each variety.

Note: This is the earliest document seen (Feb. 2005) concerning the cultivation of soybeans in Latvia. This document contains the earliest date seen for the cultivation of soybeans in Latvia (1974). The source of these soybeans is unknown. Address: Urbana, Illinois.

75. Kakushadze, L. 1974. [Contents of plastid pigments in leaves of plants given trace elements]. *Trudy Gruzinskogo Sel'skokhozyaistvennogo Instituta* 88:241-45. [Geo; rus; eng]*
Address: Sel'khozinstitut Tbilisi, Georgian SSR.

76. Mazunina, V.I.; Bakaeva, E.V. 1974. [The effect of stimulating substances from strain 912 on growth and yield in some soybean varieties]. *Kazakstan Auyl Saruasylyk Gylymynyn Habarsysy* No. 3. p. 42-44. [Rus]*
• ***Summary:*** The authors studied the effect of metabolites of actinomycete strain 912 on different soybean varieties. Treatment of seeds with the culture fluid of strain 912 increased grain yield by 2-18%, depending on the variety. The most sensitive varieties were Vysokostebel'naya 2 [Tall-stemmed 2], Khabarovsk 587, and Piramidal'naya [Pyramidal]. Address: Alma-Ata, Kazakh, SSR.

77. Akilov, U.A. 1974. [Breeding soybeans at the Kazakh Institute of Agriculture]. *Zroshuvane Zemlerobstvo (Irrigational Agriculture) Resp. Mizhvid. Temat. Nauk Zb* No. 17. p. 78-84. [Ukr]*
• ***Summary:*** In Kazakhstan, most soybean varieties from the Primor'e and Krasnodar regions of the USSR, and from China and the USA, were midseason or late. But they contained some useful breeding material. Varieties from the Khabarovsk region of the USSR and from Sweden were early, low yielding, and unsuitable for use in breeding. By gamma-irradiation of the seeds, some forms with good-quality seeds have been obtained. Address: Institut Zemledeliya, Shortandy, Kazakh SSR [Kazakh Institute of Agriculture].

78. Akilov, U. 1974. [Producing high-yielding and high-protein forms of soya bean by induced mutation]. In: Genetika i Selektsiya Rast. i Zhivotnykh v Kazakhstane. Alma-Ata, Kazakh SSR: Kainar. See p. 152-57. [Rus]*
• ***Summary:*** Dry seeds of Kormovaya Linkol'n 8 [Fodder Lincoln 8], Tomak, and VIR29 were gamma irradiated with doses of 8, 16, and 24 kR. In the M2 and M3 a large percentage of mutants was obtained, many of which gave high yields of green matter and seed, together with good values for earliness and protein content. Promising stable forms are undergoing production trials. The best of these outyields standard soybeans by 21-30% and contains 2.7 to 5.8% more protein. Address: Institut Zemledeliya, Shortandy, Kazakh SSR [Kazakh Institute of Agriculture].

79. Chernogolovin, V.P. 1974. Bobovye kul'tury v Kazakhstane [Legumes in Kazakhstan]. Alma-Ata, Kazakh SSR: Kainar. 206 p. [Rus]*
• ***Summary:*** The following legumes which grow in the Kazakh SSR are discussed: peas, soybeans, peavine *(Lathyrus spp.)*, chickpeas, lentils, *(Phaseolus vulgaris)*, lucerne, clover, sweet clover, vetch, and sainfoin. For each crop, the author discusses morphological and biological characteristics, cultivation techniques, suitable cultivars, and harvesting.

80. Mamedov, T.G.; Mirizade, A.R. 1974. [Effect of sowing methods and stand density of cereal/legume mixtures on yield and chemical composition of fresh fodder]. *Trudy, Azerbaidzhanskii Institut Kormov, Lugov i Pastbishch* 1:6-13. [Rus; aze]*
• ***Summary:*** Fresh fodder yields were higher in sorghum/soybean and maize/soybean mixtures than in their pure stands. Data on the chemical composition of fodders in mixtures and pure stands are given.

81. Karimov, Z.K.; Ganych, Z.P. 1974. [Results of a study of initial material of soya bean under irrigation in the Gissar valley]. *Sbornik Trudov Tadzhikskogo Nauchno-*

Issledovatel'skogo Zemledeliya (Transactions of the Tadzhik Agricultural Research Institute) 5:189-195. [12 ref. Rus]*
• ***Summary:*** The soybean varieties and hybrids studied fell into four groups based on maturity: Early, midseason, midlate, and late. The characteristics of the varieties belonging to each group are given.

Note 1. This is the earliest document seen (April 2008) concerning soybeans in Tajikistan, or the cultivation of soybeans in Tajikistan. Note 2. The title of this periodical varies: By 1962 it was also called: *Trudy Tadzhikskogo Nauchno-Issledovatel'skogo Zemledeliya (Transactions of the Tadzhik Agricultural Research Institute).*

Note 3. Gissar is the name of a town (population 20,000, located on a railroad) in western Tajikistan. It is also the name of a range of mountains (also spelled Hissar) and of a canal.

Note 4. A summary of this article appears in *Referativnyi Zhurnal* (1974) 11.55.181.

82. Muratgeldyev, N.N.; Muradov, K.M.; Gaevskaya, I.S.; Davydova, R.A. 1974. Nekotorye itogi i perspektivy introduktsii rastenii v Turkmenistane [Some results and prospects of plant introduction in Turkmenistan]. *Izvestiia Akademii Nauk Turkmenskoi SSR, Seriia Biologicheskikh Nauk* No. 4. p. 15-23. [10 ref. Rus]
• ***Summary:*** Discusses work on plant introduction into the Turkmen SSR during the past 50 years. New tropical legume introductions include soybeans, guar *[Cyamopsis tetragonoloba]*, Vigna species, and *Dolichos lablab [=Lablab purpureus]*.

The Botanical Garden had a close relationship with the All-Soviet Institute of Botany; they worked together to produce tropical varieties of beans. The head of the project was M.G. Popov (p. 16). In 1937, tropical and subtropical plants started to be raised in the Botanical Garden; credit is given to A.I. Mikhel'son (p. 20).

From 1962-1970 new research was conducted to introduce food and medicinal plants, including beans, to the hot and dry environment of the Turkmen SSR. Experiments were conducted with various types of tropical beans, including soybeans (p. 21). Beans that gave good yields included soybeans (p. 22). Note 1. It is not clear when the soybeans were first introduced to the Turkmen SSR. Note 2. Reference 7 (p. 23), published in 1929, is about the Botanical Garden and Botanical Institute. Address: Botanicheskii Sad AN Turkmenskoi SSR, Ashkhabad, Turkmen SSR [Botanical Garden and Botanical Inst., Academy of Sciences, Turkmen SSR].

83. Dobrunova, N.L. 1974. [Water status and photosynthesis in soybean cultivars in the foothill zone in Alma-Ata province]. In: Voprosy Povysheniya Produktivnosti Zernovykh-kul'tur. Irkutsk, USSR: [Sel'khozinstitut]. See p. 194-97. [Rus]*
• ***Summary:*** In irrigated soybean trials in Kazakhstan, the most important physiological factors for high seed yields were high contents of bound water and high water-holding capacity of leaves during the pod-formation and seed-filling stages, high heat resistance, maintenance of the synthesis ability of the leaves during wilting, a small range of variation in diurnal and seasonal photosynthetic intensity during the seed-filling stage, and low nutrient consumption for respiration under soil moisture stress. Information is given on these physiological characteristics in six soybean cultivars of different origins.

Note: Alma-Ata is the capital of the Kazakh SSR. Irkutsk is the capital of the Irkutsk Oblast, in Russia 45 miles from Lake Baikal.

84. Akilov, U. 1975. [Some results of breeding soybeans at the Kazakh Scientific Research Institute of Agriculture]. *Trudy Kazakhstanskogo Nauchno-Issledovatel'skogo Instituta Zemledeliya* No. 11. p. 129-41. [Ukr]*
• ***Summary:*** From 1962 to 1966 some 500 Soviet and foreign soybean varieties were studied. Direct correlations were found between the length of the growth period and such characters as the number of internodes, number of leaves, leaf surface area, plant height, and plant weight. The most useful initial soybean material under local conditions was midseason and late varieties from China, Moldavia, and the Krasnodar and Primor'e regions of the USSR. By individual selection, some promising forms were obtained from them. High-yielding forms with good seed quality were also selected after hybridization and mutation by gamma irradiation. Address: Institut Zemledeliya, Shortandy, Kazakh SSR [Kazakh Institute of Agriculture].

85. Muradov, K.M.; Agaev, A. 1975. [Experience in growing some legumes in oasis sands of the Turkmen SSR, USSR]. *Problemy Osvoeniia Pustyn (Problems of Desert Development) (Ashkhabad, Turkmen SSR)* No. 6. p. 53-57. [Rus; eng; tum]*
• ***Summary:*** Vigna and Dolichos beans were the most productive of 18 fodder legumes tested in the oasis sands of Turkmen SSR, USSR. They were grown with organic and mineral fertilizers, and sprinkler irrigation. Soybeans and regular beans were also grown. Address: Inst. Deserts, Acad. Sci. Turkmen SSR, Ashkhabad, USSR.

86. Kuznetsova, A.A.; Muradov, K.M.; Kazantseva, V.N. 1975. [Amino-acid composition leguminous crops of tropical origin cultivated in the Turkmen SSR (USSR)]. *Izvestiia Akademii Nauk Turkmenskoi SSR, Seriya Biologicheskikh Nauk (Proceedings of the Academy of Sciences of the Turkmen SSR, Biological Sciences Series)* No. 5. p. 19-23. [6 ref. Rus; eng; tum]
• ***Summary:*** At the beginning of anthesis, soybeans, Vigna, and Dolichos contain the highest content of essential amino

acids (86.35–99.96%). At this period, the nutritive value of the biomass is higher than that at the following phases of vegetation.

Note: *Webster's Dictionary* defines anthesis (derived from the Greek word *anthesis* = to bloom), a word first used in about 1823, as: "the action or period of opening of a flower." Address: Inst. Bot., Acad. Sci., Turkmen SSR, Ashkhabad, USSR.

87. Kazakov, A.L.; Kechatov, E.A.; Chemerko, V.M. 1975. [Isoflavones from the oil cake of *Glycine hispida* seeds]. *Khimiya Prirodnykh Soedinenii (Chemistry of Natural Compounds) (Tashkent, Uzbekistan)* 2:256-57. [Eng]*
• ***Summary:*** Tashkent is the capital of the Uzbek SSR, and also capital of the Tashkent Oblast, USSR.

88. Nalbandyan, A.D. 1975. [On the specific reaction of nodule bacteria to different glucosides]. *Biologicheskii Zhurnal Armenii (Biological J. of Armenia)* 28(1):89-90. [1 ref. Rus; arm]*
• ***Summary:*** A laboratory trial was conducted on the utilization of glucosides by Rhizobium by seven leguminous plants, including the soybean. Nodule bacteria of all species grew well on substrates containing phenol glucosides, but those of soybean nodules did not grow on flavonoid glucosides. Address: Institut Mikrobiologii, Erevan, Armenian SSR.

89. Ataev, A.; Kazantseva, V.N. 1975. [Biology of seed germination in tropical legumes in Turkmenia]. In: Izuchenie Rastitel'nosti Turkmenii. Ashkhabad, Turkmen SSR: 'Ylym.' See p. 56-58. [Rus]*
• ***Summary:*** The rate and percentage of germination of soybeans, cowpeas, and pigeon peas under laboratory conditions in Turkmenistan was highest at 25-30ºC; under field conditions, the optimum temperature was 15-20ºC. The germination rate was different for each legume.

90. Hur, Robin. 1975. Food reform: Our desperate need. Austin, Texas: Heidelberg Publishers. x + 260 p. 24 cm. [1500+ ref]
• ***Summary:*** One of earliest well-documented books on the advantages of a low-fat, low-protein, high-carbohydrate diet. Presents evidence linking chronic, degenerative diseases to a diet high in protein, fat, and meat. Advocates the SGA diet, a vegan diet based on sprouts (including spy sprouts, see p. 193), greens, and small amounts of algae. Although the book's major emphasis is nutrition, its last chapter discusses diet, resources and the environment–another first.

In chapter 4, titled "Aging," the author notes that scientists are paying a lot of attention to the Vilacabambans, Hunzas, and Abkhasians, because their life spans are far greater than those of Americans or Europeans. The diets of all three groups are very similar, bordering on vegetarianism. The Hunzas eat almost no animal products and consume meat only once a year. Also discusses the Seventh-day Adventists.

Talk with Robin Hur. 1990. Dec. 12. "I saw that the resource implications of diet–how what we ate affected the land and water–were much more important issues than the things other people were looking at at the time, namely protein." This is a rare book by a mathematician and Harvard graduate. The author wrote a second book just on diet and the environment but it was never published. One of its discoveries was the deforestation in the U.S. was rampant (62 million acres were cut to raise livestock) and the figures were being concealed by the U.S. forest service. In 1990 he was writing a book on diet and economics.

Note: This book heavily influenced Keith Akers' *A Vegetarian Sourcebook* (1983). Address: Austin, Texas.

91. Chernogolovin, V.P.; Bakaeva, E.V. 1975. [Tall soyabean cultivars, their productivity and methods for their cultivation on irrigated lands in S.E. Kazakhstan]. In: Nekotorye Voprosy Selektsii i Biologii Soi. Blagoveshchensk, USSR: [Sel'khozinstitut]. See p. 55-60. [Rus]*
• ***Summary:*** Among several tall soybean cultivars tested from 1960 to 1965 under irrigated conditions in Kazakhstan, cultivar Vysokostebel'naya-1 and -2 gave the highest seed yields. The optimum planting date was from the end of April to early May in single or double rows, 60 cm apart. Address: Sel'khozinstitut, Alma-Ata, Kazakh, SSR.

92. Mamedov, T.G.; Miri Zade, A.P. 1975. [Green fodder mixtures of maize or sorghum with soyabean]. *Vestnik Sel'skokhoziaistvennoi Nauki (Journal of Agricultural Science, Moscow)* No. 1. p. 65-68. [Rus; eng; ger; fre]*
• ***Summary:*** Irrigated field trials were conducted in the Apsheron peninsula of the East Caucasus. Note: This peninsula in eastern Azerbaijan projects into the Caspian Sea. About 400 square miles (1,036 square km) in area, it contains extensive oil fields; Baku is on the southwest coast.

Maize grown alone yielded 36.3 tonnes/ha of green fodder (7270 feeding units–FU) and 250 kg/ha of digestible crude protein (DCP). Sweet sorghum yielded 32,1-37.6 tonnes/ha of green fodder and 220-260 kg/ha of DCP. Soybean yielded 1.14-1.30 tonnes/ha of green fodder and 410-470 kg/ha of DCP. Each crop was cut at the milk-wax stage of maturity.

Mixtures of maize or sorghum with soybean yielded 36.6-47.2 tonnes/ha of green fodder and 530-650 kg/ha of DCP. When cut at the stage of panicle emergence, the FU yields were considerably lower but those of DCP higher and reached up to 710 kg/ha. Planting in hills spaced 70 x 70 cm apart and containing 2 plants of maize or sorghum and 2 or

6 plants of soybean resulted in higher yields than row planting. Address: Azerbaidzhanskii Institut Kormov, Lugov i Pastbishch, Baku, Azerbaidzhan SSR.

93. Myakushko, Y.P. 1975. [Breeding and production of soybeans for seed in the Caucasus]. PhD thesis, Leningrad. 38 p. [Rus]*
• ***Summary:*** The first planting of soybeans in the present USSR took place in 1875. In the eastern part of the country almost one million ha are planted to soybeans each year. They are also cultivated extensively in the Caucasus. The average yield in the Ukraine, when water is not in short supply, is 2.4 metric tons per ha. The Vavilov Institute in Leningrad has a collection of more than 2,700 varieties of soybeans. Address: Leningrad, USSR.

94. Chernogolovin, V.P.; Lukashov, V. 1976. [Soybeans in southeastern Kazakhstan]. *Zernovoe Khozyaistvo (Grain Farming)* No. 8. p. 46. [Rus]*
• ***Summary:*** Discusses irrigation regimes for soybeans in southeastern Kazakhstan. The optimum soil moisture contents are 40-60% of field capacity during germination, 80% during the flowering and seed formation period, and 70% during maturation. These soil moisture levels are maintained with 2-3 irrigations, each with 600 to 800 cubic meters of water, up to flowering, and 1-2 irrigations thereafter. Furrow irrigation is more effective than flood irrigation. The irrigated crops yield 2.8 to 3 tonnes/ha of seeds. Address: Alma-Ata, Kazakh, SSR.

95. Akilov, Yu.G. 1976. Selektsiya soi dlya uslovii oroshaemogo zemledeliya yuga Kazakhstana [Breeding soybeans for the irrigated conditions of southern Kazakhstan]. *Biulleten Nauchno-Tekhnicheskoi Informatsii po Maslichnym Kul'turam* No. 1. p. 27-29. [Rus]
• ***Summary:*** Soviet and foreign soybean varieties were studied. Breeding for the improvement of some characters of high-yielding forms was conducted by individual selection and hybridization. Over 4 years, green matter yield in the best hybrid varieties was 12-43% higher than in standard varieties, seed yield was 10-47% higher, and protein content was 1.0 to 5.4% higher. High green matter yields were obtained from Kazakhstan 688 and Kazakhstan 200, while Gibridnaya 670 [Hybrid 670] exceeded the standard, Vysokostebl'naya 2 [Tall-stemmed 2], by 7-11% in seed yield, the standard yielding 20.2 c/ha. Address: Institut Zemledeliya, Shortandy, Kazakh SSR [Kazakh Institute of Agriculture].

96. [New soyabean cultivars]. 1976. In: Katalog Sortov Sel'skokhozyaistvennykh Kul'tur, Vpervye Raioniruemykh s 1977 g. Moscow, USSR. See p. 34-35. [Rus]*
• ***Summary:*** Two new soybean cultivars are described. The first, Bel'tskaya 25 is adapted to Moldavia. It is early-maturing, has a 1,000-seed weight of 140-158 gm, seed oil contents of 19.3-19.8%, and is suitable for combine harvesting. In trials in 1973-75 it gave average seed yields of 2.05-2.31 tonnes/ha at 2 locations.

The second soybean cultivar, Uzbekskaya-2 is adapted to the Uzbek SSR. It matures in 130-132 days, has a 1,000-seed weight of 125-175 gm, seed oil contents of 19.23-23.4%. In trials in 1973-75 it gave average seed yields of 1.04 tonnes/ha under rain-fed conditions and 3.2 tonnes/ha with irrigation.

Note: This is the earliest document seen in connection with Uzbekistan with "soybean" in the title. It is also the earliest document seen that describes a specific soybean variety developed for or grown in Uzbekistan.

97. Karyagin, Yu. 1976. Soya v Kazakhstane [Soybeans in Kazakhstan]. *Zemledelie (Agriculture, USSR)* No. 12. p. 46-47. [Rus]
• ***Summary:*** Discusses the cultivation of soybeans in Kazakhstan. In irrigated trials in 1971-75, cultivar Vysokostebel'naya [all], Kazakhstanskaya 688, and hybrid Gibridnaya 670 gave average yields of 31.56, 32.98, and 32.49 tonnes/ha of fresh fodder, and 2.59, 2.85, and 3.7 tonnes/ha of seed, respectively. Address: Institut Zemledeliya, Politotdel, Alma-Ata, Kazakh, SSR.

98. Gadzhiev, D.M. 1976. [Sorghum in Azerbaidzhan]. *Kukuruza* No. 8. p. 16-17. [Rus]*
• ***Summary:*** In trials in 1972-73 in Azerbaijan under rain-fed conditions, sorghum grown in mixture with Sudan grass, maize, *Pisum arvense* (field pea), cowpeas, soybeans, or *Lathyrus sativus* (Lathyrus pea / chickling vetch) gave average fresh fodder yields of 57.2-68.9 tonnes/ha, compared with 51.2 tonnes/ha in pure stands of sorghum. The sorghum/soybean mixture gave the highest yields. Address: Sel'khozinstitut, Baku, Azerbaidzhan, SSR.

99. Bernhardt, C.F. 1976. The legume food crops. In: M.A. Rifai, ed. 1976. ASEAN Grain Legumes. Bogor, Indonesia: Central Research Institute of Agriculture. 225 p. See p. 29-85.
• ***Summary:*** "The Chinese did not, nor do not, grind up soybeans to mix with cereals to form a meal or boil them whole like other legumes such as peas or lentils. Prepared in the latter manner they have an unattractive flavour and are not too digestible. In the earliest Chinese writings, there is no mention of the use of soya as a source of oil. Some evidence exists that methods of extracting oil were evolved around the 4th century A.D... To sum it up, soybeans require special treatment to make them an acceptable human food.

"Legumes assume greater importance in countries where starchy roots and fruits (cassava, yam, taro, sweet potatoes and bananas) replace cereals to a large extent as staple foods. The starchy roots and fruits are so poor in protein

that they do not meet the protein requirements of even adults when consumed in quantities sufficient to cover the calorie requirements and still less when considering children and mothers."

Concerning the history of legumes: "Legumes are plants belonging to the Leguminosae family, which is the second largest family of seed plants. Altogether there are about 600 genera with 13,000 species. The word legume is derived from the Latin *legumen* which means any leguminous plant. An alternative name for edible seed of leguminous plants is pulse derived from the Latin *puls,* meaning pottage... The English term legume dates back to about the 17th century.

"Legumes are among the earliest crops to be cultivated by man, going back to Neolithic times when man was changing from hunting and food gathering culture to a food producing society. Often in the old world this is termed 'The Food Producing Revolution,' which probably took place between the 9th and 5th millennia B.C. This revolution was centered in what was called the 'Fertile Crescent' in the Near East...

"Remains of peas and lentils have been found at Halicar (Turkey) in about 5,500 B.C. (dated by carbon)... Findings at Jarno [sic, Jarmo, which is located in today's Iraq, in Iraqi Kurdistan in the foothills of the Zagros Mountains east of Kirkuk city] in Turkistan may antedate the Halicar find by perhaps a millennium, so it can be safely said that legumes have been eaten by man for some 8,000 years. Legumes also appear early in the development of agriculture in the new world. Remains of... kidney beans have been found in the caves near O'Campo (Mexico) which date back to around 4,000 B.C. or perhaps earlier... Remains of cultivated peas have been found in the Neolithic lake village in Switzerland dating back to approximately 4,500 B.C... Remains of lentils have been found in the Egyptian tombs of the 12th dynasty (2,400-2,200 B.C.). Preparation of a lentil soup was depicted in a fresco at the time of Rameses III (1,200 B.C.)... Lentils are the first legume to be mentioned in the Bible in the 25th Chapter of Genesis."

Note: Turkistan or Turkestan is an historical region of Central Asia, usually thought to comprise Turkmenistan, Uzbekistan, Kyrgyzstan, Tajikistan, southern Kazakhstan, western China, and northeast Afghanistan. Address: C.P.C. International (Asia) Ltd., Hongkong.

100. Hortus Botanicus Centralis Akademiae Scientiarum RSS Turcomaniae (Turkmen SSR). 1976. Delectus seminum quae Hortus Botanicus Centralis Akademiae Scientiarum RSS Turcomaniae pro mutua commutatione offert [List of seeds offered for exchange by the Central Botanical Garden of the Scientific Academy, Turkmen SSR]. Ashkabad, Turkmen SSR. 32 p. 22 cm. [Lat; Rus]
• ***Summary:*** Plants are listed by families in Latin. Under Leguminosae is "119. *Glycine hispida* (Moench) Maxim." A symbol indicates that it was grown at the Botanical Gardens. Address: Ashkabad, Turkmen SSR.

101. Vinogradov, B.I. 1977. [Response of grain legumes to inoculation on serozem soils of Uzbek SSR]. *Nauchnye Trudy, Tashkentskii Sel'skokhozyaistvennyi Institut (Scientific Works–Tashkent Agricultural Institute)* No. 75. p. 16-23. [Rus]*
• ***Summary:*** In pot and field trials conducted during 1967-1975 in the Uzbek SSR, inoculation of seeds of soybean, cowpea, and green gram [mung bean] *[Vigna radiata]* increased growth, nodulation, and seed yield. Various cultivars of these crops showed different responses to inoculation.

Note: This document contains the earliest date seen for soybeans in Uzbekistan, or the cultivation of soybeans in Uzbekistan (1967). The source of these soybeans is unknown.

102. Glushenkova, N.I. 1977. [Evaluation of breeding material of pulses in Uzbekistan]. *Mirov. rastitel'n. resursy v Sredn. Azii* No. 75. p. 16-23. [Rus]*
• ***Summary:*** The following crops were tested for use in breeding varieties suitable for irrigated conditions in Uzbekistan: Soya bean, chickpea, *Phaseolus radiatus,* and cowpea.

103. Brown, Elaine. 1978. Soviets tackle increasing protein deficiency: Soviet Union's expanding need for high-protein livestock feed may be a bright spot for soybean exports. *Soybean Digest.* Jan. p. 6-7.
• ***Summary:*** Dr. Victor Lishchenko, a leading Soviet expert on oilseeds, predicted that Soviet soybean production will expand rapidly in the next few years but added that the potential for that expansion is limited. Production could double from the present 2 million acres, but that's all. On irrigated land they get yields of 25-50 bu/acre but on dry land its much lower. To increase production, they would have to rely on irrigated land which is very expensive. "The Soviets' current Five-Year Plan for 1976 through 1980 calls for new production of soybeans on irrigated land in the south of the Russian Federation and the Ukraine, in Moldavia and the Transcaucasian Republics [of Georgia, Armenia, and Azerbaijan]. It also outlines plans 'to evolve suitable strains of soya and develop a technology for cultivating it in the republics of Central Asia and in Southern Kazakhstan.'...

"Lishchenko says the Soviet Union's 'protein problem' is not a lack of protein in Soviet diets, but instead it's a problem of increasing animal protein... He points out that even though the USSR is the world's second largest meat producer, per capita meat consumption is only a little over half of that in the United States. The average Soviet citizen now consumes 56 kilograms (kg) of meat per year. But

Lishchenko says his government hopes to raise that to 80 kg in the near future.

"To meet growing demand for meat, milk and eggs, one goal of the current Five-Year Plan is to switch livestock production over to what Soviets call 'industrial' methods. Lishchenko says changeover got underway in the early 1970's when collective farms and state farms began pooling their resources to form large-scale poultry and hog 'factories.'...

"'Our livestock population consumes about 370 million tons of feed units a year,' Lishchenko explains. 'But they're not adequately balanced with protein. As a result, feed consumption is unduly high.'"

104. Nasyrov, Yu. S. 1979. Fiziologo-geneticheskie osnovy povysheniya urozhainosti sel'skokhozyaistvennykh kul'tur [Physiological and genetic bases for increasing the yielding ability of agricultural crops]. *Sel'skokhozyaistvennaya Biologiya* 14(6):762-766. Nov/Dec. [12 ref. Rus; eng]
• ***Summary:*** Outlines achievements in breeding for increased photosynthetic activity. Crops without apparent photorespiration (such as corn, sorghum, and sugar cane) produce yields twice as large as those with photorespiration (such as wheat, sugar beet, soya beans, and cotton). However attempts to block photorespiration are seen as not promising. Address: Institut fiziologii i biofiziki, Dushanbe, Tajik SSR.

105. Muradov, K.M.; Ivantsova, M.A.; Kazantseva, V.N. 1979. [Soyabean in Turkmenia]. *Korma (Feeds)* No. 6. p. 29-30. [Rus]*
• ***Summary:*** In 1972-78, in irrigated trials under dryland conditions in south Turkmenia, late-maturing soybean varieties yielded 30-50 tonnes/ha of fresh fodder and 1.7 to 2.1 tonnes/ha of seeds. Mid-season varieties yielded 20-30 and 1.2 to 1.5 tonnes respectively, and early-maturing varieties yielded 9-15 and 1 to 1.2 tonnes respectively.

Depending on the variety, the plants contained 28.6 to 32.1% crude protein [CP] at the flower initiation stage, 26.5 to 27.2% CP at the full-bloom/early pod formation stage, and 21.4 to 22.3% CP at the pod formation stage. Also gives information on biological characteristics of soybeans under Turkmenian conditions. Address: Institut Botaniki, Ashkhabad, Turkmen SSR.

106. Rybina, E. 1979. Tsennaya kormovaya dobavka [A valuable feed supplement]. *Ptitsevodstvo (Poultry Raising)* No. 7. p. 24-25. [Rus]*
• ***Summary:*** Soya bean oilmeal and cottonseed oilmeal were used in different amounts in the diets of 7 groups of Leghorn hens. The average number of eggs laid during 11 months and the average egg weight was measured. Accumulation of gossypol in the meat and eggs was an issue, but was less than the permissible amount. Address: Uzbekskii Nauchno Issledovatel'skii Institut Zhivotnovodstva, Tashkent, Uzbek SSR.

107. Gorelov, E.P.; Ermatova, D. 1979. [Soyabean in Uzbekistan]. *Korma (Fodder)* No. 2. p. 31. [Rus]*
• ***Summary:*** Discusses the production of soybeans for fodder production in Uzbekistan. Yields of 22.2- 23.9 tonnes/ha were obtained.

Note: This is the second earliest document seen in connection with Uzbekistan with the word "Soybean" in the title. Address: Sel'khozinstitut, Smarkand, Uzbek SSR.

108. Ivantsova, M.A.; Muradov, K.M.; Kazantseva, V.M. 1980. Itogi introduktsii soi i dolikhosa v Turkemenii [Results of the introduction of soybeans and *Dolichos lablab* cultivars into the Turkmenistan SSR, USSR]. *Izvestiia Akademii Nauk Turkmenskoi SSR, Seriya Biologicheskikh Nauk (Proceedings of the Academy of Sciences of the Turkmen SSR, Biological Sciences Series)* No. 6. p. 71-74. [10 ref. Rus]
• ***Summary:*** From 1962 to 1979 some 263 soybean varieties and 334 *Dolichos lablab [Lablab purpureus]* varieties were introduced and studied to investigate their potential productivity as soiling, silage and grain, and prospects for selection or agricultural production. The results are summarized. Data are presented on the productivity of a new cultivar of each species. From K1487, a new midseason soybean variety from the USA, was bred by individual selection and called Bakhar 2. It is resistant to high temperatures, low humidity, lodging, shedding and fungal diseases. In trials from 1977-79 it yielded 45.5 to 50.9 kg/ha of green matter and 1.8 to 2.0 tonnes/ha of seeds. The green matter contained 26.5 to 27.2% protein.

These cultivars may be recommended for cultivation in regions with a long frost-free period and high summer temperatures. They are valuable as silage.

The title page of this issue reads: *Turkmenistan SSR Ylymlar Akademijasynyn Habarlary, Biologik Ylymlaryn. Izvestiia Akademii Nauk Turkmenskoi SSR, Seriya Biologicheskikh Nauk.* Address: Institut Botaniki, Acad. Sci., Ashkhabad, Turkmen SSR.

109. Daminov, Kh.; Ermatova, D. 1980. [Our experience of soyabean cultivation]. *Kormoproizvodstvo* No. 6. p. 22. [Rus]*
• ***Summary:*** In trials conducted during 1978 and 1979 under the dry and hot climatic conditions of Uzbekistan, three fertilizers (NPK) were applied to 3 soybean cultivars grown in loamy serozem soils: 60 kg of nitrogen, plus 40 kg of phosphoric anhydride, plus 45 kg of potash. These fertilizers increased the average seed yield by 520-620 kg/ha from 2.2-2.5 tonnes/ha without NPK. Seed inoculation, fertilizers, and especially both gave increased nodulation

and seed protein contents. Address: Sovkhoz ’50 Let UzSSR’ Kashkadar’inskoi Oblasti, Uzbek SSR.

110. Nabiev, T. 1981. Urozhainost’ khlopchtnika v zavisimosti ot predshestvennikov [Cotton yield in relation to preceding crops]. *Khlopkovodstvo* No. 4. p. 24. [Rus]
• ***Summary:*** In trials in 1978-79 in the in the Tajik SSR, cotton was grown after cotton, soybeans, soybeans grown from inoculated seeds, corn, and mung beans (Vigna radiata). The average seed-cotton yields, ginning percentages, and fiber lengths are given for each sequence. Address: Sel’khozinstitut, Dushanbe, Tajik SSR.

111. Burygina, O.V. 1982. [Results of scientific research in the production of high-yielding soyabean varieties in Uzbekistan]. *Selektsiya i Semenovodstvo, USSR (Plant Breeding and Seed Production)* No. 9. p. 20-21. [Rus]*
• ***Summary:*** Soybean breeding in the Uzbek SSR, which began in the 1960s, is summarized. The high-yielding variety Uzbekskaya 2, selected from the population Mestnaya Zelenaya [Local Green], was released in 1977. Varieties bred more recently are Dustlik and Yulduz, which are undergoing state variety trials. Promising early varieties, which ripen in 60-90 days, have been selected as breeding material. Some of them yield 23-29 gm of seed per plant–namely K4122, Khabarovskaya 41, and K3927. Lists are also given of varieties useful in breeding for many branches and high yield. Promising intervarietal crosses are also listed; from one of these the line S39278 was selected for its high yield. Some success has been achieved with mutation breeding. The new variety Aziatskaya, submitted for state trials in 1980, was obtained by gamma radiation of seed from Uzbekskaya 2. Address: Uzbekskii Institut Risa, Uzbek SSR.

112. Karimov, Z.K.; Ganych, Z.P.; Khusainov, A.Kh. 1982. Rezul’taty nauchnogo poiska v sozdanii produktivnykh sortov soi [Results of scientific research in the production of high-yielding soybean varieties (in Tadzhikistan / Tajikistan)]. *Selektsiia i Semenovodstvo, USSR* 1982. No. 9 p. 21-22. [Rus]
• ***Summary:*** Contains a short history of soybean breeding work since 1970 at the Tadzhik Institute of Agriculture. Since there were no local soybeans grown in Tadzhikistan before 1970, researchers at the above Institute collected about 1,000 soybean varieties from countries of similar climate throughout the world, including the Kuban Lowland (a former administrative unit of southern Russia in Europe along the Kuban River and northeast coast of the Black Sea, now largely in Krasnodar Kray), eastern Ukraine and Moldova. Acclimatization trials showed that soybeans from the U.S. and Bulgaria gave the best results.

Considerable hybrid material has been developed, and from this individual and mass selection has been performed. Promising, high-yielding lines have been from (Kirovogradskaya 3 x VSGI80) x Madison, K5660 x VNIIMK6, and Adams x Terezinskaya2.

Note: This document contains the earliest date seen for soybeans in Tajikistan, or the cultivation of soybeans in Tajikistan (1970). The origin of these soybeans is given in the article. Address: Institut Zemledeliya (Inst. of Physical Geography), Dushanbe, Tadzhik SSR.

113. *SoyaScan Notes.*1983. What is kefir? (Overview). June 15. Compiled by William Shurtleff of Soyfoods Center.
• ***Summary:*** Kefir is an acid-alcohol fermented milk that originated and is still most widely consumed in the area of the Caucasus Mountains which form the border between southern Russia (Ciscaucasia, on the north) and Transcaucasia (Georgia, Azerbaijan, and Armenia, on the south). This area is between the Black and Caspian seas, on the boundary between Europe and Asia. Kefir is made from the milk of the goat, sheep, or cow. As of 1983 kefir accounts for approximately 65% of the fermented milks in the USSR. Per capita consumption is 10-15 lb/year. Real kefir contains a lot of carbon dioxide (which gives it a delightful effervescence–”the champagne of dairy foods”) and up to 1% alcohol. Kefir is made from kefir grains, which are moist, gelatinous, whitish or yellowish, irregular granules that look like miniature cauliflowers and range in size from that of wheat grains to walnuts. They are stable conglomerates of lactic acid bacteria and yeasts, held together by a polysaccharide gum called kefiran produced by the predominant bacterial species, probably *Lactobacillus brevis.* Predominant yeasts include *Torulopsis holmii* and *Saccharomyces delbrueckii* in a ratio of about 10:1. The process is based on the symbiotic action of lactic acid bacteria and yeasts. The kefir culture doesn’t require a sustained high temperature for incubation. The optimum temperature is room temperature (17-23ºC).

Commercial soymilk kefir, named SoyTreat, was introduced into the United States in Nov. 1999 by Lifeway Foods Inc.

114. *USDA Plant Inventory.*1983. Plant material introduced January 1 to June 30, 1980 (Nos. 436991 to 443013). No. 188, Part I. 529 p.
• ***Summary:*** Soybean introductions: Glycine max (L.) Merrill. Fabaceae.

“Donated by Dr. N.I. Korsakov, Division of Grain Legume Crops, N.I. Vavilov Institute of Plant Industry, Leningrad, Soviet Union.” All these varieties are designated “VIR” (Vavilov Inst.).

437069-437085. Amur Region and Far East

437124-437128. Gurijscaja and Imeretinscaja, Georgian SSR.

437129A-B. Irkutsk Region (Oblast) of Russia.

437130-437134. Gibrid ASS, Kazakh SSR.

437135-437148. Khabarovsk Province, USSR [on right bank of Amur River]

47149-437171. Krasnodar Province, USSR.

437172-437175. Kuybyshev Region, USSR.

437176-437178. Latvian SSR.

437179-437188. Lithuanian SSR.

437189-437303. Bel'tscaja, Bessarabea, Biruintsa, Brynzenscaja, Corichevava, CSchi, Dobruzanca, Errj, Moldavscaja, Rajner, Scorospelca, Staroucrainea, Vengerca nizcaja, Vysocoroslaja, Moldavian SSR.

437304. Moscow Region. 437305-437312. North Osetian [Ossetian] ASSR (An autonomous republic in the southeastern Russian SFSR on the north slopes of the Central Caucasus Mountains, bounded on the north by Stavropol Kray; Renamed Alania in 1991; capital Vladikavkaz).

437313-437315. Novosibirsk Region, USSR.

437316-437520. Primorsky Province, USSR [Maritime Province in Russian Far East, bordering on Sea of Japan, China and North Korea. Administrative center and soybean port: Vladivostok].

437521. Stavropol Province, USSR.

437522. Tshuvashskaja ASSR.

437523-437524. Turkmen SSR.

437525-437549. Ukranian SSR.

437550. Uzbek SSR (later Uzbekistan).

437551-437552. Voranezh Region, USSR.

437553-437813. Peoples Republic of China.

437814-438273. China, Northeast [formerly Manchuria] incl. Charbin [Harbin], Elita, Manczurscaja.

438274-438295. Japan (many named varieties).

438296-438309. South Korea (Republic of Korea).

438310-438312. North Korea.

438312-438341. Algeria.

438342. Argentina.

438343-438513. Australia, Bulgaria, Canada, Czechoslovakia, France, West Germany, East Germany, Hungary, India, Indonesia, Israel, Italy, Morocco, Nepal, Netherlands, Poland, Portugal, Romania, Sweden (13 Fiskeby varieties), United States (26 named varieties), Yugoslavia.

440913. Wild soybean from China. "Donated by Kirin Academy of Agricultural Sciences, Kungchuling, Kirin Province. Received through W.O. Scott, Dep. of Agronomy, Univ. of Illinois, Urbana. Received March 1980. Collected 1979.

440927-440943. *Glycine canescens* F.J. Herman. From Australia. "Donated (but not collected) by T. Hymowitz, Dep. of Agronomy, Univ. of Illinois, Urbana. Received Aug. 1979.

440944-440974. *Glycine clandestina* Wendl. From Australia. Donated by T. Hymowitz.

440975. *Glycine falcata* Benth. From Australia. Donated by T. Hymowitz.

440976-440977. *Glycine latrobeana* (Meissn.) Benth. From Australia. Donated by T. Hymowitz.

440978-440980. *Glycine latifolia* (Benth.) Newell & Hymowitz. From Australia. Donated by T. Hymowitz.

440981. *Glycine tabacina* (Labill.) Benth. From Fiji. Donated by T. Hymowitz. Collected 1930. Sigatoka, Viti Levu, Fiji. Collected by Greenwood. Wild.

440982-440997. *Glycine tabacina* (Labill.) Benth. From Australia. Donated by T. Hymowitz.

440998-441011. *Glycine tomentella* Hayata. From Australia. Donated by T. Hymowitz.

441012-441013. *Glycine tomentella* Hayata. From China. Donated by T. Hymowitz.

441339-441383. *Glycine max* (L.) Merr. Soybean. From Indonesia (East Java, Central Java, West Nuca Tanggara [West Nusa Tenggara, incl. Lombok and Sumbawa islands, in eastern Indonesia]). Donated by S. Djojoderdjo and Soebekti, Univ. of Gadjah Mada, Jogjakarta [Yogyakarta].

442003-442004. From China, Peoples Republic of. Donated by Institute of Crop Breeding and Cultivation, Chinese Academy of Agricultural Science, Beijing. Received through G. Liang, Dep. of Agronomy, Kansas State Univ., March 1980.

442005-442021. From South Korea. "Donated by Applied Genetics Laboratory, Korea Atomic Energy Research Inst., Seoul Received through R. Loiselle, Plant Gene Resources of Canada, Ottawa.

442022-442045. *Glycine max* (L.) Merr. Soybean. From Poland. "Donated by Plant Breeding and Acclimatization Inst., Radzikow / Warszawy. Some also from the Soviet Union and Yugoslavia.

442834. *Glycine max* (L.) Merr. Soybean. From China, Peoples Republic of. "Donated by T.C. Tso, Tobacco Laboratory, USDA, Beltsville, Maryland." Collected from a market near Quilin, Kwansi Province.

Note: In Part II: 445842-445849. From. Thomas A. Lumpkin, Zhejiang Academy of Agricultural Sciences, Hangzhoe, Zhejiang, China. Address: Washington, DC.

115. *Maslichnye Kul'tury (Oil Crops).*1984. [New varieties: Sunflower, soyabean]. No. 2. p. 11. [Rus]*

• ***Summary:*** Describes briefly seven soybean and two sunflower varieties newly bred or introduced in the USSR. Bred in Moldavia: Bel'tskaya 80 is an early variety with a growth period of 97-101 days and fairly good resistance to Septoria. Bred in Ukraine: (1) Veselovskaya 1 is midearly, with a growth period of 104-117 days, and is fairly resistant to Phakopsora; (2) Veselka, a midseason variety with a growth period of 120-125 days, is moderately resistant to bacterial diseases. Bred in the Soviet Far East: VIR14 is a midearly variety with a growth period of 106-109 days and moderate resistance to bacterial diseases. Bred in the Uzbek SSR: Dustlik, a midseason variety with a growth period of 111 days, is resistant to bacterial diseases. Bred in the

Ukraine: Niva, an early variety with a growth period of 98-101 days, is fairly resistant to bacterial diseases. Bred in the Georgian SSR: Senaki, a midseason variety with a growth period of 120-135 days, is moderately resistant to bacterial diseases.

116. Nagornyi, V.D.; Plyushchikov, V.G. 1984. [Productivity of mixed stands of maize and soyabeans on a serozem soil of the Golodnaya steppe]. In: Puti povysheniya proizvodstva rastitel'nogo belka (Means of Increasing Productivity). Moscow, USSR. See. p. 36-44. [Rus]*
• ***Summary:*** In the Golodnaya steppe of Uzbekistan, a mixed stand of intercropped maize (52,000 plants/ha) and soybeans (48,000 plants/ha) gave yields of 61.6 tonnes/ha of fresh fodder and 24.6 tonnes/ha of dry matter–compared with 63 and 23 tonnes, respectively, for maize at 55,000 plants/ha in pure stands. Crude protein [CP] yield in the mixed stand was 280 kg/ha higher than for maize in pure stand. Seed inoculation with Rhizobium increased the weight and CP content of soybean plants. New photosynthetic activity [NAR] of the mixed stand was higher than that of the pure maize stand.

117. Nigmonov, M. 1985. Elektroforeticheskoe povedenie ingibitorov proteinaz semian nekotorykh sortov soi [Electrophoretic behaviour of proteinase inhibitors of seeds of some soyabeans cultivars]. *Akademii Nauk Tadzhikskoi SSR, Dushanbe. Doklady* 28(11):667-670. Nov. [8 ref. Rus; eng]
Address: Inst. of Physiology and Plant Biophysics, Academy of Sciences of the Tadzhik SSR.

118. Kakharova, Kh.D. 1985. [Seasonal rhythm of development in soyabean and Vigna]. *Izvestiia Akademii Nauk Tadzhikiskoi SSR, Biologicheskikh Nauk* Dep. 7587V, 8 p. [3 ref. Rus]*
• ***Summary:*** The 20 soybean varieties and forms studied differed in the length of their growth period and individual phenological stages of development. There was considerable variation among forms in the time from seed formation to full ripeness (32-43 days). The growth period lasted from 97-102 to 125 days.

119. Umarov, Z.U.; Abdazov, K.A.; Radzhabova, M. Ya. 1985. [The pattern of plant distribution and yield]. *Kormoproizvodstvo* No. 3. p. 39-40. [Rus]*
• ***Summary:*** Maize and soybeans were grown in separate rows of a pair of rows 20 cm apart with an interspace of 70 cm between the two pairs of rows. This pattern gave yields of 115.9 tonnes/ha of fresh fodder, 2088 feed units [FU] per ha, and 2.32 tonnes/ha of digestible crude protein [DCP], compared with 101.4 tonnes, 1826 FU and 2.03 tonnes/ha respectively, where two maize plants and 4 soybean plants were grown in the same hill in rows 90 cm apart. Address: Tashkentskii Sel'skokhozyaistvennyi Inst., tashkent, Uzbek SSR.

120. Davronov, I.D.; Zakharov, I.A. 1985. [Induction of mitotic crossing over and somatic mutations in soyabean by treatment with neutrons (0.8 MeV) as compared with gamma rays]. *Genetika, USSR (Genetics)* 21(11):1864-1868. [13 ref. Rus; eng]*
• ***Summary:*** Soybeans were treated with gamma rays and neutrons to study the frequency of mutations. It was concluded that irradiation induces all types of genetic changes, neutron radiation being more effective than gamma rays in inducing mutations and mitotic crossing over. Address: Samarkand Univ., Uzbek SSR.

121. Karyagin, Yu. G. 1985. [Results of studies on the breeding and agronomy of soyabean]. In: Povyshenie effektivnosti i ustoichivosti zemledeliya osnova intensifikatsii rastenievodstva. Alma Ata, Kazakh SSR. See p. 221-237. [Rus]*

122. Kudrischev, T.K.; Zharasov, Sh. U. 1985. Der Einsatz von Herbiziden bei Sojaaussaaten. Schutz technischer Kulturen vor schaedlichen Organismen [The use of herbicides when planting soybeans. Protecting technical crops from harmful organisms]. In: Kazachisches NIIZR (Kazakh Scientific Research Inst. of Plant Protection), Sammlung wiss., Arbeiten. Alma-Ata. See p. 143-58. [Ger]*
• ***Summary:*** Preemergence application of Sencor (0.6 to 0.8 kg/ha) gave good control of weeds in soybeans in Kazakhstan. The yield of soybeans was 149-155% of the untreated control. The Sencor treatment did not have any adverse effect on the quality, thousand seed weight, or oil content of the soybeans.

123. Aliev, D.A.; Akperov, Z.I. 1985. [Dynamics of crop structure and photosynthetic indices of soyabean genotypes]. *Izvestiia Akademii Nauk Azerbaidzhanskoi SSR, Biologicheskikh Nauk* No. 3. p. 3-10. [Rus; aze]*
• ***Summary:*** The photosynthetic activity of several soybean cultivars, differing in seed habit and yield, were studied and compared in order to find the indices and conditions determining the best crop structure. The results were of benefit in revealing internal mechanisms of productive processes at the whole plant level, in evaluation of initial breeding material, and in developing the optimum physiological model of a cultivar.

124. Nigmonov, M.; Shibnev, V.A. 1986. Vliyanie gibridizatsii na soderzhanie v soe belka masla i ingibitorov proteinaz [Influence of hybridization on protein, oil and proteinase inhibitors in soyabean]. *Izvestiia Akademii Nauk SSSR, Biologicheskaya* No. 5. 787-790. Sept/Oct. [6 ref. Rus; eng]

• ***Summary:*** In a comparison of the protein and oil contents, and trypsin and chymotrypsin inhibitor activity in the seeds of 4 soybean hybrids and their 8 parental varieties, the hybrids were generally intermediate in protein content between their parents, put closer to the pollen parent. Gibrid 31 contained 48% protein, exceeding its parents. Oil content ranged from 20.7 to 27%, and was highest in Gibrid 26. The hybrids were closer to the maternal parent in oil content. In trypsin inhibitor activity, the hybrids were closer to the pollen parent, but in chymotrypsin inhibitor activity, they were closer to the maternal parent. Address: 1. Inst. of Plant Physiology and Biophysics, Academy of Sciences of TSSR (Institut Fiziologii i Biofiziki Rastenii), Dushanbe, Tajik SSR; 2. Inst. of Molecular Biology, Academy of Sciences of the USSR, Moscow.

125. Karyagin, Yu.; Ivashkina, G.D. 1987. [Useful forms of soyabean for breeding in south-east Kazakhstan]. *Priemy-regulirovaniya-produktivnosti-soi* 1987. p. 82-88. [Rus]*

126. Malinovskii, B.N.; Shnurnikova, G.V. 1987. [Increasing protein content in fodder of mixed stands of grain sorghum with grain legumes]. *Doklady Vsesoyuznoi Ordena Lenina i Ordena Trudovogo Krasnogo Znameni Akademii Sel'skokhozyaistvennykh Nauk Imeni V. I Lenina* No. 8. p. 11-12. [Rus]*

127. Karyagin, Yu G. 1987. [The problems of increasing soybean cultivation]. *Maslichnye Kul'tury (Oil Crops)* 1987. No. 1. p. 9-11. [Rus]*
Address: Kazakhskii N. Institut Zemledeliya, Alma ata, Kazakh SSR.

128. Kidrishev, T.K. 1988. Effektivnost' gerbitsidov v posevakh soi [Efficiency of herbicides in soybean crops]. *Agrokhimiia (Agricultural Chemistry)* No. 12. p. 105-08. Dec. [10 ref. Rus]

129. Shchelko, L.G.; Demchenko, V.P.; Prostakova, Zh.G.; Lazarev, A.M. 1988. [Problems of breeding soyabean for immunity in the Central Asian republics]. In: Ispol'zovanie mirovykh kollektskii polevykh kul'tur dlya sozdaniya sortov intensivnogo tipa v usloviyakh Uzbekistana. Tashkent, Uzbek SSR. See p. 85-93. [11 ref. Rus]*
• ***Summary:*** In breeding soybeans for resistance to the main fungal, bacterial, and viral diseases in Soviet Central Asia, sources of resistance selected under artificial infection in various parts of the USSR are recommended. Appropriate breeding methods are discussed, especially hybridization (to produce single or complex hybrids), induced mutation, and biotechnological techniques, with constant selection of useful forms under artificial infection.

130. Soldatov, P.K.; Abdurakhmanova, A.A.; Kan, S.V. 1989. [Effect of industrial and agricultural pollution on the genetic toxicity of the soil]. In: A.I. Taskaev, ed. 1989. Ekologo geneticheskie posledstviya vozdeistviya na okruzhayushchuyu sredu antropogennykh faktorov. Syktyvkar, USSR. See p. 89. [Rus]*
• ***Summary:*** Soybean lines heterozygous for a gene of chlorophyll deficiency were used to study the effect of soil samples from the agricultural regions of the Samarkand and Bukhara provinces of the Uzbek SSR and from near a Samarkand factory producing chemicals. The soil from Samarkand had the greatest mutagenic effect owing to a higher content of pesticide residues, but the overall effect was weak; no mitotic crossing over was induced. The industrial soil, especially that taken from an area to the west and northwest of the pollution source, increased the mutation frequency by a factor of 2-3 compared with the control.

131. Abdullaev, M.A.; Gyulaliev, T.D. 1990. [Effect of high rates of mineral fertilizers on the uptake of 90Sr and 137 Cs in the yield of various crops]. *Izvestiia Akademii Nauk Azerbaidzhanskoi SSR, Biologicheskie Nauki* No. 6. p. 58-61. [Rus]*
• ***Summary:*** Data are given for soybean, chickpeas *(Cicer arientinum),* and barley *(Hordeum vulgare).* Address: Scientific Research Institute for Agriculture, Baku, Azerbaijan.

132. Roslyakova, N.V.; Akhmetkalieva, Z.D.; Moldabekova, A.N.; Ahigaeva, M.K. 1990. [The influence of metal salts on nodule bacteria of soya and clover]. *Izvestiia Akademii Nauk Kazahskoi SSR, Seriya Biologicheskaya* 1990. No. 1. p. 64-67. [5 ref. Rus; kaz]*
Address: Institute of Microbiology and Virusology, Academy of Sciences, Kazakhstan.

133. Kurbanov, G.K.; Atabaeva, Kh.N. 1990. [Plant density and yield]. *Tekhnicheskie Kul'tury* No. 6. p. 19-20. [Rus]*
• ***Summary:*** In irrigated trials conducted in 1986-88, three soybean cultivars were grown at 350,000, 450,000 or 550,000 plants/ha and given either no fertilizer or 80, 120, or 160 kg/ha of phosphorus, in addition to 50 kg/ha of nitrogen and 80 kg/ha or potassium.

Mid-season cultivars Uzbekskaya 2 and Dustlik grown at 450,000 plants/ha (for both fresh fodder and seed production) and given NK + 120 kg/ha of potassium, and the late maturing cultivar Uzbekskaya 6 grown at 450,000 to 550,000 plants/ha (for fodder) and 350,000 plants/ha (for seed) and given NK + 160 kg/ha of potassium, gave the highest fresh fodder (39.9, 42.3, and 37.8-38.6 tonnes/ha, respectively) and seed yields. Effects of these treatments on yields of crude protein [CP] and fodder units [FU] are also described.

Note: This journal was also titled *Voprosy Uluchsheniya Kachestva Sel'skokhozyaistvennoi Produktsii, Trudy Nauchnoi Sessii Ukrainskoi Akademii Sel'skokhozyaistvennykh Nauk (Problems of Improving the Quality of Farm Production, Transactions of the Scientific Session of the Ukranian Academy of Agricultural Sciences).* Address: Tashkent Agricultural Institute, Tashkent, Uzbekistan.

134. Giller, Yu.E. 1991. UV-B effects on the development of photosynthetic apparatus, growth and productivity of higher plants. In: Impact of Global Climatic Changes on Photosynthesis and Plant Productivity: Proceedings (of the Indo-US Workshop. New Delhi, India): Oxford & IBH Publishing Co. Pvt. Ltd. See p. 77-93. Held 8-12 Jan. 1991 at New Delhi, India. See p. 77-93. [34 ref. Eng]
• ***Summary:*** In field experiments at Dushanbe, cotton and soybeans were exposed to UV-B radiation from 10:00 to 16:00 local time (6 hours). The yields of the two crops decreased 23% and 20% respectively. Soybeans are particularly sensitive to UV-B radiation. Address: Inst. of Plant Physiology and Biophysics of the Academy of Sciences of Tajik SSR, Dushanbe [Tajikistan] USSR.

135. Gubanov, Alexander. 1991. Plans to start four tofu companies in the Soviet Republic of Georgia (Interview). *SoyaScan Notes.* Aug. 13.
• ***Summary:*** These four companies would like to produce 1 ton/day of tofu to meet Soviet food and protein deficits. They are now looking for an equipment supplier. Alexander worked at Wildwood Natural Foods in Fairfax, California, making tofu for several years.

Follow-up talk. 1991. Sept. 23. Mohammed Barai is a man of Afghan descent (his ancestors immigrated to Georgia before 1917) who comes from Tbilisi (formerly called Tiflis), the capital of the Georgian S.S.R. in the Caucasian mountains. He now lives in Moscow where he runs an import company; he also has an office in Tbilisi. He will be importing tofu equipment to make tofu in Georgia, then organizing the tofu production. The Georgian government will help pay the costs of the tofu plants. Alexander will be visiting the Soviet Union very soon. Address: Georgia Export Co., P.O. Box 1492, Ross, California 94957.

136. *SoyaScan Notes.*1991. Chronology of the USSR (Union of Soviet Socialist Republics) from 1917 to 25 Dec. 1991. Dec. 23. Compiled by William Shurtleff of Soyfoods Center.
• ***Summary:*** 1917–The Russian Revolution begins in Moscow during World War I. Factory workers strike demanding higher wages. Czar/Tsar Nicholas II (reigned 1894-1917; lived 1868-1918) is forced to abdicate in March, ending czarist rule. He and the royal family (his wife, Alexandra, and five children, including the heir, Alexi–who was afflicted with hemophilia–and princess Anastasia) are sent from St. Petersburg into internal exile in the Ural mountains. A provisional democratic government is led by Alexander Kerensky. 1917 Nov. 7–The Kerensky Provisional Government and the freely-elected Constituent Assembly are overthrown in a Bolshevik / Marxist / Communist coup led by Vladimir Ilyich Lenin–who has no interest in continuing the war. Russia, the main part of the former czarist empire, is the first part to come under control of the Bolshevik party and the Soviets. (Note: The term "Soviet," meaning "council," was first used in 1917.) Its first constitution is adopted on 10 July 1918.

1918 Jan.–Ukraine declares independence from the disintegrating Russian empire. 1918 July–Czar Nicholas II and his family are executed in the town of Ekaterinburg (later renamed Sverdlovsk) in the Ural mountains. Lenin gave the execution order. Nicholas was the last czar, ending the 300-year rule of the House of Romanov. Some consider this massacre to be the first terrorist act of the 20th century. The deaths sent shock waves through Europe and presaged the end of other royal dynasties in Germany and Austria before the end of 1918. 1918-20–Period of unrest and civil war in which Bolsheviks (in 1919) defeat the anti-Communists. Under Trotsky's direction, the Red Army grew to 3 million during 1919. Lenin begins to nationalize the economy, bars private trade, and collectives farms. 1921-22–A severe famine causes about 4 million deaths; it is caused largely by the imposition of a command agricultural economy, the collectivization of farms, and the forced requisition of food by the government.

1922–The Union of Soviet Socialist Republics is organized out of four republics: Russia, Byelorussia, Ukraine, and Transcaucasia (comprising Armenia, Azerbaijan, and Georgia). Joseph Stalin begins his rise to power. 1924 Jan. 21–Lenin dies, but leaves a warning about Stalin. In the resulting power struggle, Stalin emerges by 1926 as absolute ruler of the USSR. 1929–Stalin expels his rival Trotsky from the USSR.

1930s–Stalin begins the Great Purge; political opponents are executed and millions of citizens are shot or imprisoned. He ruthlessly collectivizes Soviet agriculture, replacing peasant farms with large state-run enterprises. A series of five-year plans develop heavy industry. 1939–Non-aggression pact with Nazi Germany gives the Baltic nations of Latvia, Lithuania, and Estonia to the Soviet Union.

1941 June–Germany breaks the non-aggression pact, invades the Soviet Union. A major turning point of the war was the battle of Stalingrad in the winter of 1942-42; the entire German army surrendered. 1945–Soviet troops capture Berlin, help defeat Germany. Peace talks at Potsdam split Germany, Berlin, and most of Europe into Western and Communist blocs. 1946–Speeches by Stalin and Britain's Prime Minister Winston Churchill start the Cold War.

Churchill says on 5 March 1946 that an "Iron Curtain has descended across the continent." 1953 March 5–Stalin dies. After a power struggle, Nikita Khruschev is elected first secretary of the Central Committee of the Communist Party. He begins rehabilitating victims of Stalin's purges. 1956–Khruschev condemns Stalin's rule by terror and "de-Stalinization" of the country on all levels takes place. He urges "peaceful coexistence" with the West. Soviet tanks put down Hungarian uprising. 1957 Oct. 3–Sputnik, the world's first space satellite, is launched by the USSR, demonstrating great capabilities in science and technology.

1961 April 12–Yuri Gragarian of the USSR makes the world's first manned space flight. 1962–Communism becomes entrenched in China, North Korea, and elsewhere. 1962 Oct.–Cuban missile crisis. The world holds its breath as a U.S. naval blockade forces Khruschev to remove missiles from Cuba. 1964 Oct.–Khruschev is suddenly deposed and replaced as party first secretary by Leonid I. Brezhnev. 1968–Soviet forces crush Czechoslovakian freedom movement.

1970–Soviet dissidents become more visible. Writer Alexander Solzhenitzyn, once imprisoned by Stalin in Gulag, wins Nobel Prize. 1979–Soviet forces entered Afghanistan but left in defeat in 1988.

1982–Brezhnev dies; Yuri V. Andropov assumes control. 1984–Andropov dies; Konstantin U. Chernenko assumes control, then dies one year later. 1985 March–Mikhail S. Gorbachev is chosen general secretary of the Communist Party. He was the youngest member of the Politburo and signalled a change in Soviet leadership. He meets president U.S. President Reagan in Geneva. 1986–Gorbachev initiates a program of reforms, including expanding freedoms and democratization of the political process through openness (glasnost) and restructuring (perestroika). Boris Yeltsin becomes a Politburo member. 1987–Yeltsin, saying Gorbachev is moving too slowly, resigns top party posts. 1988- Gorbachev wins approval for multi-candidate elections, and creation of a full-time parliament. Withdraws 250,000 troops from Eastern Europe. Reagan makes first visit to Moscow, praises Gorbachev for glasnost and perestroika. 1989–The first Soviet Parliament was held since 1918. Several top communists loose elections. Yeltsin wins Moscow seat with 98% of the vote. Soviets withdraw from Afghanistan. Gorbachev purges Politburo of hard-liners, is elected president of the new Soviet parliament. On November 3, East Germany opens its borders and the Berlin Wall to the West; 200,000 East Germans have already left their country during the past 2 months–even though it has the highest standard of living of any East Bloc nation. The Wall begins to be dismantled. On Dec. 11 Gorbachev announces the "end of the Cold War" (it is now 42 years old) and the start of a new era in U.S.-Soviet cooperation. He says we need "new political thinking."

1990–Pressured on the left and right, Gorbachev fends off conservative assaults at 28th Congress. Yeltsin and other reformers leave the Communist party. Reformers protest in huge demonstrations. Lithuania declares independence. Eduard Shevardnadze resigns as foreign minister predicting a "looming dictatorship." Conservatives demand action to stop dismantling of the union. 1991–The Warsaw Pact is disbanded. Yeltsin wins election as Russian president, then bans Communist Party activity in the workplace. Gorbachev ousted in Aug. by hard-liners, but coup fails; he quits as party chief, dismantles the party. Yeltsin, after pivotal role in foiling the coup, expands his authority. On 25 December 1991, as Gorbachev resigns, the Soviet Union breaks up on into 15 republics. The hammer and sickle flag, flying over the Kremlin, is lowered, and replaced by the flag of Russia, ending the domination of the Communist Party over all areas of national life since 1917.

1991–The remains of Czar Nicholas II and the members of his family are uncovered from an unmarked grave in the Ural Mountains. In July 1998 the bones are given a royal burial in St. Petersburg with rites of the Russian Orthodox Church.

137. *SoyaScan Notes.*1991. Chronology of Russia from A.D. 911 to 1916. Dec. 23. Compiled by William Shurtleff of Soyfoods Center.

• ***Summary:*** A.D. 911–A Russian principality, ruled from Kiev, emerges. 988–Prince Vladimir of Kiev adopts Byzantine Christianity and orders his people to be baptized. Their faith evolves into Russian Orthodoxy and helps isolate Russia from Roman Catholic Europe. 1240-1380–Invading Mongols control Russia. Drawn to their Asiatic empire, Russia becomes even more alien to Europe. 1547–Ivan IV (the Terrible), a prince from Moscow, is the first to adopt the ancient title of caesar *(tsar* in Russian), which connotes a divinely appointed ruler. He and his successors unify fragmented Russian lands and begin taking Siberia. 1682-1785–Peter the Great rules, extending Russia's domain. Russia looks westward after 1698, when he returns from touring Europe. In 1721 Peter founds the Russian Empire. Conquering territory along the Baltic sea, he builds his landlocked realm a new port capital, St. Petersburg (known as Leningrad from 1924 to 1991), and establishes a navy. Peter's successors add new regions to the growing empire, including Georgia and the Caucasus Mountains, and try to Russianize their peoples.

1858-1860–Chinese withdrawal from the left bank of the Amur and Ussuri rivers marks the start of an active Russian policy in the Far East. 1867–Russia sells Alaska to the United States. 1875–Secures Sakhalin. 1895–Secures rights to the Liaotung Peninsula. 1898–Leases rights to Kwantung (southern part of the Liaotung Peninsula. Capital: Dairen) from China after pressuring China. 1894-1917–Nicholas II

rules as Tsar. He struggles to retain his autocratic powers in the face of demands for political and social reforms.

During the 19th and early 20th centuries, modernization and Western ideas concerning democracy, socialism, freedom, etc. spread through the huge Russian empire, put political evolution failed to keep pace. In fact, the tsars stifle revolutionary outbursts throughout the 19th century. So Russia enters the 20th century enormous, imperial, and resistant to reform.

1905–Russia loses the Russo-Japanese war (1904-05) to Japan–a disastrous and humiliating defeat that revealed the inefficiency and negligence of the Tsarist regime and opened it to attack by Russian citizens. Japan becomes the first non-white or non-Western nation to defeat a white or Western nation. The Treaty of Portsmouth, signed on 5 Sept. 1905, ends the war, restores at least in theory China's sovereignty and administration in Manchuria, and gives Japan the Russian lease on the Kwantung Peninsula and the Russian-built South Manchuria Railway as far north as Changchun. 1905 Oct.–Following a massacre of peaceful protesters in St. Petersburg on 9 Jan. 1905, a general strike in Russia expresses the civil unrest and discontent. Tsar Nicholas II thereupon issues his October Manifesto, which promises a constitution and a parliamentary assembly (the Duma). But by 1906 it becomes clear that Nicholas II has no intention of relinquishing his autocratic powers.

138. Tikhonova, O.R. 1991. [Yield of soyabean varieties under irrigation in the Tselinograd province of northern Kazakhstan]. *Nauchno Teknicheskii Biulleten' Vsesoyuznogo Ordena Lenina i Ordena Druzhby Narodov Nauchno Issledovatel'skogo Instituta Rastenievodstva* 1991. No. 213. p. 65-66. [Rus; eng]*
Address: VIR, St. Petersburg, Russia.

139. Sukhoruchenko, G.I.; Kapitan, A.I.; Serebrennikova, N.I. 1991. Optimizatsiia assortimenta sredstv bor"by s vrediteliami soi [Optimization of the range of control measures used against soyabean pests]. In: Novozhilov, K.V., et al. 1991. Ekologicheskie Osnovy Primeneniia Insektoakaritsidov: Sbornik Nauchnykh Trudov (Ecological Basis for Insectoacaracide Application: Collection of Scientific Works). Leningrad, Russia: VIZR. 118 p. See p. 103-110. [12 ref. Rus; eng]
• ***Summary:*** In 1981-85 investigations were conducted on the harmful and beneficial arthropods of soybean crops in southern Tajikistan and the Amur and Crimean regions of the former USSR, and on their dynamics. The results are given along with results of tests on chemical control of these insects. Address: Ekologicheskie osnovy primeneniya insektoakaritsidov.

140. Alibekova, Sh.B.; Bakenov, K.Z.; Mamilov, Sh.Z. 1991. [Effectiveness of inoculation with different strains of nodule bacteria under conditions of irrigated meadow-serozem soils of the Tas-Otkel massif]. *Izvestiia Akademii Nauk Kazakhskoi SSR, Seria Biologicheskaya* 1991. No.3. p. 67-69. [Rus; kaz; eng]*
Address: Institute of Soil Science, Alma-Ata, Kazakh SSR.

141. Mirkhabibov, O.M.; Ermatova, D.E. 1991. [Soyabeans in the Golodnaya steppe]. *Kormovye Kul'tury* No. 1. p. 26-27. [Rus]*
• ***Summary:*** From 1986 to 1988 trials were conducted in the Sirdar'ya region of Uzbekistan on soybean cultivars Dustlik and Khodson. Average seed yields were 3.62 tonnes/h and 3.30 tonnes/ha respectively, compared with 3.21 tonnes/ha for the standard cultivar Uzbekskaya 2. Three other cultivars gave lower yields. Address: Agricultural Institute, Samarkand, Uzbek SSR.

142. *SoyaScan Notes.*1992. The five Central Asian Republics, formerly part of the USSR (Overview). Feb. 25. Compiled by William Shurtleff of Soyfoods Center.
• ***Summary:*** These republics, located in the far south of the former USSR and far away from Moscow, border on Iran, Afghanistan, and China. The mountains of Central Asia are remote and exotic lands, stretching from the Caspian Sea to the Gobi Desert. Alexander the Great and Genghis Kahn conquered these hills. Marco Polo crossed them on his way to China. Its ancient cities were major stops on the silk route. Long ago, Samarkand was a world capital. Many believe that Central Asian civilization peaked in the 9th and 10th centuries, during a great Iranian dynasty. Toward the end of the 10th century, this dynasty and the people were increasingly overrun by nomads speaking Turkish from the East. After the Turks came the Mongols under Genghis Khan. The Central Asians learned many new technologies from these contacts: silk culture, and the making of glass, paper, and carpets. Central Asia assimilated all its invaders but one–the Russians. The Russian invasion had the most long-lasting effect. The Russian empire pushed southward in the 19th century. Between 1859 and 1865 Russians conquered an area that they called Russian Turkistan or Turkestan. The chief cities were Tashkent, Samarkand, and Bukhara–all 3 in today's Uzbekistan. By 1886 the Russians had conquered the entire region. Once the Soviet regime came in, it tried to make deep changes in Central Asian culture. Lenin practiced respect and justice to these ethnic minorities, these non-Russian republics, but Stalin did not. These native people and tribes had loyalties to Islam and to the idea of a Turkik people, Turkistan or Turkestan. Then between 1920 and 1925 Stalin divided Turkistan into 5 different republics, somewhat artificially. They were the Turkmen, Uzbek, Tadzhik, Kirgiz, and South Kazakh S.S.R.s. The eastern part of Kazakh (Chinese Turkestan, Kashgaria, or Eastern Turkistan) is now part of the Chinese province of Sinkiang Uighur (Xinjiang Uygur). Today, after

independence, these republics are called Turkmenistan, Uzbekistan (the largest population, 29 million), Tadzikistan, and Kirghizia, and Kazakhstan (the largest area with 16.5 million population). In 1924, all of these border lines and ethnic divisions were new on the map, and between 1924 and 1936 each of the new areas became a constituent republic of the USSR, i.e. a a Soviet Socialist Republic. The Soviets undermined local arts and traditions, closed all local mosques and schools (which were all religious). The arabic alphabet, the sacred language of the Koran, was replaced by the Russian Cyrillic alphabet. Native languages were officially discouraged. Stalin built labor camps and prisons for political prisoners in northern Kazakhstan, and later the Kazakh desert was made into the USSR's nuclear weapons testing ground. The once huge Aral sea has been reduced in size by 2/3 (an ecological disaster, shrinking from the world's 6th largest lake to the 9th in only 2 years), as water has been diverted to irrigate nearby cotton crops. The Soviets turned Uzbekistan into one huge cotton plantation, boosting cotton production 10-fold with the massive use of fertilizers, pesticides, and herbicides–which poisoned the drinking water and food supply, even breast milk. Central Asia has an infant mortality rate 4 times that of the former USSR–the highest in the developing world. Yet some conditions, especially in the cities, improved under the Communists; they banished the veil, sent women to school and put them to work. Literacy rates, down around 1% in 1917, are now reportedly near 100%. Bloody ethnic disputes over land and water have erupted throughout the region since mid-1989. In 1989 Central Asians went to the polls in the Soviet Union's first open election, and each Central Asian Republic ousted Russian as the official state language, replacing it with the native language. Strictures against the practice of religion (Islam) were lifted, so that the number of mosques has grown from 160 to more than 5,000. One worry on these relatively poor Muslim republics: ethnic turmoil could arise in the future, triggered by chances f a Muslim fundamentalist movement.

143. Kolak, Ivan; Henneberg, R.; Milas, S.; Radosevic, J.; Satovic, Z. 1992. Soybean breeding and seed production in Croatia–Current status and perspectives. *Eurosoya* No. 9. p. 76-84. Dec. [31 ref]

• ***Summary:*** "Soybean seed was introduced from China by sailors from Dubrovnik for the first time in 1800 and, the same year it was planted in Dubrovnik, Konavle, Slano and Ston under the name 'Chinese yellow beans' (p. A. Buconjic 1804 cit. according to fra. I. Simic, 1826). Soybean was spread from Dubrovnik to the Neretva Valley (Opuzen, Metkovic, Caplijna, Mostar) and the seeds were used for human consumption and as poultry feed. The Franciscans from Dubrovnik selected the best plants from crops and the seed was sold on markets. As early as 1804 the seed selected within soybean population was sold under the name "Dubrovnik yellow beans" and since then individual selection of soybean population began. During the 19th century, by constant selection of the best and healthiest plants, soybean production began to be based upon domesticated and well adapted indigenous populations and selected lines. Soybean was grown mainly in gardens and rarely as a major crop. It was used for human consumption and as feed for livestock.

"A planned introduction of soybean to Croatia was initiated by the Austrian biochemist Friedrich Haberlandt (lived 1826-1878) after the seed exhibition in Vienna in 1873. He introduced about 20 cultivars from China, Japan, Korea, Tunisia and Transcaucasia and carried out several multicultivar adaptation trials from Bohemia to Dubrovnik. Unfortunately his intentions were misunderstood and that was the main reason why soybean did not spread significantly in Croatia at that time.

"More comprehensive work on the introduction of soybean in Croatia was carried out by Stjepan Cmelik in Korija near Virovitica. The lack of cattle feed in 1921 stimulated him to import several cultivars from China and Manchuria. He tested them and selected only those plants which reacted favourably to agroecological conditions. In this way he started soybean selection in Croatia and after several years the so-called 'Cmelik's soybean' was developed and largely extended over the regions of Posavina and Slavonija region (maturity group 1). Friedrich Reiner continued to grow 'Cmelik's soybean' on his farm near Osijek selecting the best plants and he created his own improved cultivar named 'Osjecka'. Between 1931 and 1934 seed yield of the cultivar 'Osjecka' varied from 1.6 to 2.2 tons/hectare and that was the reason why it was extended over Podunavlje, Posavlje, Romania and Bulgaria.

"Academician Alois Tavcar brought Manchurian soybean populations from Prague [Czechoslovakia] in 1918 and began his research work at the Faculty of Agriculture and Forestry in Zagreb. By individual selection of the best plants from introduced populations he released the first domestic soybean cultivars M 7, M 14 and M 60 (M stands for Maksimir, experimental field near the Faculty of Agriculture in Zagreb). These cultivars had shorter vegetation than Cmelik's and Osjecka and were spread in the production of the northwest region of Croatia, as well as in Slavonia and Srijem.

"During the second world war the old genotypes were saved. After the war more intensive soybean introduction and breeding started in Croatia. The new young generation of plant breeders–Tavcar's successors–continued to work on soybean breeding and seed production: V. Milinlkovic (1946-1950) and Ruzica Henneberg (1952-1953 and 1958-1992)–Tavcar's assistants at the Faculty of Agriculture in Zagreb; D. Palaversic (1946-1950) at the Institute for Plant Breeding and Crop Production in Botinec near Zagreb; M. Budisic (1945-1970), Marija Vrataric (1970-1992) and M.

Krizmanic (1973-1978) at the Institute of Agriculture in Osijek; I. Vicic (1960-1980), F. Satovic (1960-1980) and I. Kolak (1973-1987) in the Croatian Agricultural Centre in Zagreb–Sesvete. During this period a considerable number of cultivars and lines were released...

"The world-wide gene-collections were established at the Faculty of Agriculture in Zagreb–Maksimir (Milinkovic, Henneberg), Zagreb–Botinec (Palaversic), Zagreb–Sesvete (Satovic) and Osijek (Vrataric). In the 1950s D. Palaversic started to work on maize breeding and the soybean gene-collection from Botinec was transferred to the Faculty of Agriculture, Zagreb–Maksimir. The same thing happened in 1987 with the gene-collection of the Croatian Agricultural Centre when I. Kolak came to work at the Faculty of Agriculture from the Centre. In 1982 Jasna Radosevic started to work on the soybean breeding programme at the Faculty of Agriculture.

"From 1950 to 1980 many introduced and domestic cultivars were examined in a network of small-plot multicultivar trials at various locations arranged in conjunction with the Agricultural Extension Service. From 1979 to 1989 the Faculty of Agriculture in Zagreb and Institute of Agriculture in Osijek joined the European network on soybean."

Graph 1 shows soybean area and yield from 1947 to 1990. Prior to 1981 soybean area was less than 5,000 ha; it reached about 5,000 ha in 1949, 1950, and 1973. During the 1980s soybean area grew rapidly from about 2,000 ha in 1980 to 27,000 ha in 1990. Yield rose steadily from about 600 kg/ha in 1947 to 2,000 kg/ha in 1959 to 2,750 kg/ha in 1989. Table 1 shows cultivars released in Croatia from 1804-1991, including the breeder's name, cultivar name, maturity group, year of release, production region, and range of yields. Table 3 shows minimal and maximal yields of Croatian soybean cultivars in small plot trials from 1980 to 1990. The record yield of 4.5 tonnes/ha was attained by the cultivar named Tisa at Darda in 1988.

Note: This document contains the earliest date seen for soybeans in Croatia, or the cultivation of soybeans in Croatia (1800). The source of these soybeans was China.
Address: Faculty of Agriculture, Univ. of Zagreb, Svetosimunska 25, 41000 Zagreb, Croatia.

144. Food and Agricultural Organization of the United Nations. 1992. Soybeans: Area harvested, yield, and production. *FAO Production Yearbook (Rome, Italy)* 46:115-16.
• ***Summary:*** The following nations are listed for the first time as soybean producers in the *FAO Production Yearbook.* F = FAO estimate. * = Unofficial figure. Burkina Faso: Harvested 5,000F ha in 1990, 1991, and 1992.

Panama: Achieved yields of 747 kg/ha in 1991.

Syria: Harvested 5,000* ha in 1991 and 1992.

Albania: Harvested 4,000 ha in 1979-81, 10,000 ha in 1990, 9,000F ha in 1991, and 10,000F ha in 1992. Note: This is the earliest document seen (May 2003) that contains statistics on soybean production in Albania.

Bosnia and Herzegovina: Harvested 8,000 ha in 1990, 6,000* ha in 1991, and 5,000F ha in 1992.

Croatia: Harvested 27,000 ha in 1990, 23,000 ha in 1991, and 26,000 ha in 1992.

Macedonia: Achieved yields of 1,314 kg/ha in 1990, 1,833 kg/ha in 1991, and 1,600 kg/ha in 1992.

Slovenia: Achieved yields of 1,692 kg/ha in 1990, 2,000 kg/ha in 1991, and 978 kg/ha in 1992.

Former Soviet Republics–Azerbaijan: Harvested 1,000* ha in 1990, 1,000* ha in 1991, and 1,000F ha in 1992.

Georgia: Harvested 8,000 ha in 1990, 6,000 ha in 1991, and 6,000F ha in 1992.

Kazakhstan: Harvested 23,000* ha in 1990, 18,000* ha in 1991, and 19,000F ha in 1992.

Moldova: Harvested 26,000* ha in 1990, 20,000* ha in 1991, and 20,000F ha in 1992.

Russia (Russian Federation): Harvested 741,000 ha in 1979-81, 675,000 ha in 1990, 664,000 ha in 1991, and 632,000 ha in 1992.

Ukraine: Harvested 69,000 ha in 1979-81, 87,000 ha in 1990, 100,000 ha in 1991, and 100,000F ha in 1992.

Thus in 1992 the former Soviet Union harvested 800,000F hectares of soybeans. The leading countries, in descending order of soybean production, were Russia, Ukraine, Moldova, and Kazakhstan.

145. Kalmakbaev, T. Zh. 1992. [Behavior of pesticides with differing phytosanitary function in the soil under conditions of irrigation]. *Agrokhimiya* 1992. No. 9. p. 9, 117, 121. [11 ref. Rus]*
Address: All-Russian Inst. Plant Protection, Russian Academy of Agricultural Sci., Pushkin, St. Petersburg.

146. Ismukhambetov, Zh.D.; Karbozova, B.E. 1992. Iz opyta zashchity soi [Experiences in soyabean protection]. *Zashchita Rastenii, Moskva (Plant Protection, Moscow)* 1992. No. 10. p. 23-24. [Rus]
Address: Kazakhstan Sci. Research Inst. Plant Protection, Alma-Ata, Kazakhstan.

147. Jimoh, Akin. 1993. Two billion people suffer from diet deficiencies–FAO... adopts new action plan against hunger and malnutrition. *Guardian (Manchester).* Jan. 7. p. 19.
• ***Summary:*** "More than two billion people, out of a total world population of 5.4 billion, suffer from diet deficiencies that could lead to blindness, mental illness or occasionally even death, according to the Food Agriculture Organisation (FAO). However experts denounce this paradox in which the world has enough resources to feed its entire population, while at the same time millions of children die of hunger

and two billion people suffer from malnutrition." These grave matters were discussed at the Alma-Ata [Kazakhstan] Conference on Primary Health Care (PHC).

"The International Conference on Nutrition, bringing together ministers of agriculture and health in a 'World Nutrition Summit,' ended last month in Rome after adopting a World Declaration expressing determination to eliminate hunger and reduce all forms of malnutrition.

"The six-day conference of over 160 governments and around 160 international and nongovernmental organizations jointly sponsored by the UN Food and Agriculture Organization (FAO) and the World Health Organization (WHO)–also called on the United Nations to consider urgently the issue of declaring an International Decade of Food and Nutrition to help achieve the objectives of the Declaration."

Measures of nutritional problems in infants and children: Low birth weight, infant mortality rate (IMR), Protein-Energy Malnutrition (PEM, the main cause of IMR, and the most important nutrition-related disease), iodine deficiency disorders (IDD), anemia, and vitamin A deficiency. Address: Health reporter.

148. Food and Agricultural Organization of the United Nations. 1993. Soybeans: Area harvested, yield, and production. *FAO Production Yearbook (Rome, Italy)* 47:106-07.

• ***Summary:*** The following nations are listed for the first time as soybean producers in the *FAO Production Yearbook.* F = FAO estimate. * = Unofficial figure. In 1992 Azerbaijan, Georgia, Kazakhstan, Moldova Rep., Russian Fed., and Ukraine were listed under "Former USSR." This year they are listed under either Asia (Azerbaijan, Georgia, Kazakhstan) or Europe (the rest).

Burundi: Harvested 1,000F ha in 1991, 1992, and 1993. The yield was 1,024 kg/ha in 1979-1981, and 1,000 kg/ha in 1991-1993. There are listings for both Ethiopia and Ethiopia PDR [People's Democratic Republic]. Ethiopia PDR: Harvested 4,000 ha of soybeans in 1979-81, and 7,000F in 1991 and 1992.

Azerbaijan: Harvested 1,000F ha in 1992 and 1993. The yield in each of those years was 1,000 kg/ha.

Georgia (Republic of Georgia): Harvested 6,000F ha in 1992 and 1993. The yield in each of those years was 1,000 kg/ha.

Kazakhstan: Harvested 19,000F ha in 1992 (yield = 684 kg/ha) and 20,000F ha in 1993 (yield = 900 kg/ha).

Czech Republic: Harvested 1,000 ha in 1993. The yield was 1,118 kg/ha.

Moldova (Republic of Moldova): Harvested 17,000 ha in 1992 (yield = 477 kg/ha) and 20,000F ha in 1993 (yield = 1,500 kg/ha).

Russian Federation: Harvested 645,000 ha in 1992 (yield = 783 kg/ha) and 619,000* ha in 1993 (yield = 889 kg/ha).

Slovakia: Harvested 8,000F ha in 1993 (yield = 1,558 kg/ha).

Ukraine: Harvested 97,000 ha in 1992 (yield = 784 kg/ha) and 70,000 ha in 1993 (yield = 871 kg/ha).

There are listings for both Yugoslav SFR and Yugoslavia, FR. The later is a new listing. Yugoslavia, FR: Harvested 68,000 ha in 1992 (yield = 1,138 kg/ha) and 55,000* ha in 1993 (yield = 1,498 kg/ha).

149. Hymowitz, Ted. 1994. Publications on soybeans from Eastern Europe and Russia (Interview). *SoyaScan Notes.* Dec. 20. Conducted by William Shurtleff of Soyfoods Center.

• ***Summary:*** Ted has piles and piles of documents related to soybeans in Eastern Europe and Russia that he hasn't even looked at. "And this is only one of many boxes." They were sent by Bogdan Belic (a real scholar) and other colleagues in Eastern Europe. One Russian-language book (44 pages) titled *Soya,* by A.E. Vochino, was published in 1901. Also a 1910 Russian-language booklet (16 pages) titled *Soja cultivation and application* by Timofeeff.

One book (written using the Cyrillic alphabet) on the *History of Novi Sad (Historia Novi Sad)* was published in 1975 in Novi Sad. Its German original is kept at the manuscripts department at Matissa Sopa in Novi Sad. It was translated by Tomislav Belchik with comments by Dr. Slavo Garalovich. Novi Sad (German: Neusatz) is a city and chief town of the Vojvodina autonomous region in Serbia, northern Yugoslavia, on the Danube River. It was part of Hungary until the formation of Yugoslavia in 1918. This history book contains a chapter on the "History of the Sajakaska Battalion. Part I," by General Avram Gushik. It talks about the early history of "Persian soybeans," with 36 references. It discusses the history of the Sajkaska region. "In 1817 two lots of 'Persian soybeans' were planted for tests. The yield was 5+ pounds and 25 lots of grain. Two years later 'Persian soybeans' were planted again on a much larger area. This time the yield was 27 pounds and 12 lots of seed, brought the yield up to 358 pounds and 8 lots. In 1820 the entire last year's crop was planted, but the yield was only 8 pounds because of severe drought. It was decided to abandon the intensive planting of 'Persian soybeans' and leave it up to the borders to plant them at will. It was found that the Persian soybean yielded less meal than the domestic soybean." Note: Persian soybeans could be chick peas. But the last line seems to indicate that soybeans were well known in the area by 1820.

Ted has a 1910 (March 12) Russian-language letter concerning Soy Coffee in Tiflis, Georgia. We have the letter in English from Frank N. Meyer. Address: Prof. of Plant Genetics, Urbana, Illinois.

150. Petunova, A.A.; Dolzhenko, W.I.; Machankova, T.A.; Kirilenko, A.I.; Galiev, M.S. 1994. Long-term investigations

on the use of Sencor (metribuzin) in the former Soviet Union and its successor states. *Pflanzenschutz-Nachrichten Bayer (English Edition; Bayer Plant Protection Reports)* 47(1):57-72. [18 ref. Eng; ger; fre; spa; rus]
• ***Summary:*** Between 1978 and 1980 field trials with the herbicide Sencor (metribuzin) were conducted on soybeans at eight locations in the former Soviet Union: in the Ukraine (in both the Kiev district and the Crimea), in Georgia, in Moldova, and at four locations in the Russian Federation (Saratov, Krasnodar, Amur district, and the Primorski region). The herbicide was sprayed prior to the emergence of the soya beans at an application rate of 0.4 to 1.5 kg/ha.

The results are summarized here with the specific names of weeds and dosages. Very good control of dicotyledonous annual weeds was achieved during emergence. Annual grasses were harder to control. To deal with these, Sencor had to be combined with a herbicide (such as trifluralin) designed specifically for grasses. "The use of Sencor (0.5 kg/ha) for control of annual dicotyledonous weeds and grass weeds in preemergent soya was officially registered in the USSR." Address: Research Inst. of Plant Protection, Dep. of Plant Protection, Russian Academy of Sciences, Pushkin 6, 188620 St. Petersburg, Russia.

151. Stephens, Jerry L.; Schmidt, Natalia. 1995. Re: Interest in making and eventually marketing soyfoods. Involvement in activities in the Former Soviet Union, especially Russia and Uzbekistan. Letter to William Shurtleff at Soyfoods Center, Dec. 4. 1 p. Typed, with signature. [1 ref]
• ***Summary:*** Jerry and his wife Natalia have a beginner's interest in learning as much as they can about making and marketing soyfoods. They have read *The Book of Tofu,* by Shurtleff and Aoyagi, which they obtained from their local library. "At this time we don't know enough to even begin to guess where this will lead. But, we are both very adventurous, entrepreneurially inclined and determined to find a way.

"Also, as Natalia told you, we are both involved in various activities in countries of the Former Soviet Union. This includes both Russia and Uzbekistan." Address: 8139 Flintwood Court, Charleston, South Carolina 29406. Phone: 803-572-2687.

152. Doidge, Brian. 1996. Canadian soybean export prospects for 1996. *Canadian Export Soybeans (OSGMB, Chatham, Ontario, Canada)* 9(1):3-4. Jan.
• ***Summary:*** "The recent formation of the Canadian Soybean Export Association (CSEA), serves to focus attention on this rapidly growing sector of the Canadian soybean industry." The 1994/95 crop set a new record with soybean exports of 524,254 tonnes (19.26 million bushels). Another strong year is projected for 1995/06.

Note: The CSEA is an association of major Canadian soybean exporters; the association does not itself export. One of its major objectives is to lobby the Canadian government for funding and promotional support.

Talk with Michael Loh of Canada. 1996. Jan. 24. Members of CSEA include W.G. Thompson, Maple Leaf Foods, Cargill, etc. Nutrisoya, Inc. will also be a member.

A half-page table (p. 3) shows Ontario soybean supply and demand for 4 years from 1992/93 to 1995/96. Under soybean supply, statistics show: Acres harvested, beginning stocks, production, imports, and total supply. Under soybean supply are: Crush, export, seed, other domestic use, and total use. Plus ending stocks and average price per bushel.

A full-page table (p. 4) lists Ontario soybean exports for 4 years from 1991/92 to 1994/95. Ontario's top four export customers in Asia in 1994/95 were: Japan (25,988 tonnes), Hong Kong (23,311), Singapore (22,502), and Malaysia (16,231). Others are Indonesia, North Korea, Philippines, and Taiwan. The top 4 customers in Western Europe in 1994/95 were: Netherlands 73,654 tonnes, Spain 61,134, France 51,119, Belgium 15,428. In Eastern Europe, Poland bough 10,000+ tonnes in 1993/94 and 1994/95 and Uzbekistan bought 7,117 tonnes in 1993/94. Total exports have grown steadily from 238,809 tonnes in 1991/92 to 495,772 tonnes in 1994/95. Address: Education and Business Manager, Ridgetown College of Agricultural Technology.

153. Vance, Sherry. 1997. Soy-related index cards in the Bailey Hortorium's index system of botanic garden seed lists and nursery or seed catalogs developed by Ethel Zoe Bailey (Interview). *SoyaScan Notes.* April 10. Conducted by William Shurtleff of Soyfoods Center.
• ***Summary:*** In this index system, there are eleven major cards and eight minor cards related to the soybean. The minor cards each have 3-part scientific names beginning with *Soja hispida* (e.g., *Soja hispida alba)* which are not well known, and which appear in only 1-4 catalogs–usually from Germany. On each card are two-part coded entries referring to botanic gardens. Part 1 is the code for the name of the botanic garden, and part 2 is the last two letters of the earliest year in which the plant for that card appeared in this garden's catalog. For example "Kew 33" refers to the 1933 catalog of the Royal Botanic Gardens at Kew, England. [LR 1982] means that a list of seeds and plants (whether or not it contained soy) was "Last Received" from that source in 1982.

Eight cards, all listing only foreign (European) sources, contain the supposedly scientific names (listed here alphabetically) of the following subspecies or varieties of *Soja hispida;* none of these names, however, appear in the SoyaScan database (May 1997). *Soja hispida alba* (1 source). *Soja hispida brunnea* (1 source). *Soja hispida Dickmana* (1 source). *Soja hispida japonica* (2 sources). *Soja hispida lutea* (3 sources). *Soja hispida nigra* (4

sources). *Soja hispida ochroleuca* (1 source). *Soja hispida vilnensis* (2 sources).

Many of these early catalogs were divided into two parts: Farm seeds and garden seeds. When she looked for soybeans in some of these early seed catalogs, Sherry usually found them listed in the Farm section, often under the scientific name *Soja hispida.* When one seed company [perhaps W. Atlee Burpee 1896] "re-introduced" the plant as the "German Coffee Berry" the other firms were a little annoyed since they had already been offering it under *Soja hispida,* and now this newcomer was getting all the credit for introducing a supposedly new seed or plant. Address: Research Aide, L.H. Bailey Hortorium, 462 Mann Library, Cornell Univ., Ithaca, New York 14853-4301. Phone: 607-255-7981. Fax: 607-255-7979.

154. Hymowitz, Ted. 1997. Testing of soybean varieties in the former Soviet Union (Interview). *SoyaScan Notes.* Aug. 8. Conducted by William Shurtleff of Soyfoods Center.
• ***Summary:*** Many of the soybean varieties that were tested in the various Soviet Socialist Republics (such as Latvia, Lithuania, or Georgia) were sent there from the Vavilov (pronounced vah-VEE-loff) Institute located in located in Leningrad and Moscow. This institute, whose full name is the N.I. Vavilov All-Union Institute of Plant Industry (VIR), has a soybean germplasm collection containing some 4,700 accessions. Address: Prof. of Plant Genetics, Univ. of Illinois, Urbana, Illinois.

155. *Georgian Chamber of Commerce & Industry Expert (Tblisi, Georgia).*1998. Soya processing production in Georgia. No. 1. p. 25.
• ***Summary:*** According to Avtandil Korakhashvili, Director General of the "Soya Center," his organization cultivates about 514 ha of soybeans in western Georgia, in the Khobi and Senaki regions, then processes the beans at its own factory. The Center is preparing high-protein, inexpensive food products and protein concentrates for cattle-breeding.

156. *Georgian Business Week (Tblisi, Georgia).*1998. The Union of Soy Producers was founded in Georgia. No. 154. Oct. 12-18. p. 9.
• ***Summary:*** Prof. Avtandil Korakhashvili was chosen chairman of the Union.

157. Korakhashvili, Avtandil. 1999. Curriculum vitae. Tblisi, Georgia. 2 p. Unpublished typescript. 30 cm. [Eng]
• ***Summary:*** Dr. Korakhashvili was born on 24 Sept. 1949 in Tblisi, Georgia. Nationality: Georgian. He is married and has two children. His wife, Nino Gudushauri, is an economist, born on 17 Oct. 1959. People in Georgia write their last name first. His main position is Chair of Forage Production, Georgian Agrarian State University in Tblisi.

7. Educational background: Georgian Agrarian State University (GASU, Faculty of Agronomy) 1966-71. Post-graduate and PhD work 1975-79. In 1979 he was awarded his PhD degree. Student of English at the Georgian Pedagogical Inst. of Foreign Languages 1976-78; awarded certificate. He is fluent in Georgian and Russian, and speaks excellent English.

9. Academic training: Head of Chair GASU: 1989-. Full Professor, Doctor of Agronomy: 1982-1990. Professor of Agronomy at Georgian Agricultural Institute 1979-1982. Head of Department, Georgian Ministry of Agriculture and Food: 1976-79.

10. National or Regional Offices held: Chairman of Georgian Soybean Association: 1998-. Adviser of Georgian Parliament counsel: 1996-1998. etc.

11. International travel and teaching: 8 items from 1974-1999.

12. Publications: 3 books authored, 1 book edited, 1 English-Georgian Dictionary of Forage Production, 28 agricultural journal articles, 2 patents, 16 popular articles in magazines, 27 articles in agricultural experiment bulletins.

13. Research: "Major emphasis has been on establishment, management, processing and utilization of legumes for food and feed uses... Legume research has been important throughout the years and more recently centered on soybeans. All of this has culminated in the last publications directed at extension private farmers and livestock producers of Georgia."

14. Teaching: Forage production and management environmental crop growing. 15. Major professor: PhD degree–19 students. MS degree–24 students. Address: Soya Center, Inc., 19 Petriashvili St., Tblisi 380079. Phone: +995 32 22 6751.

158. Korakhashvili, Avtandil. 1999. Re: The Georgian Soybean Association. Letter (e-mail) to William Shurtleff at Soyfoods Center, Nov. 6–in response to inquiry. 1 p. [Eng]
• ***Summary:*** The Georgian Soybean Association, founded in 1998, is located at 19 Petriashvili St., Tblisi, 380079, Republic of Georgia. Phone: +995 32 22 6751. Fax: +995 32 95 1090. E-mail: gscra@access.sanet.ge. Contact: Avtandil Korakhashvili, Chairman.

Membership: 2 state universities, 2 academies of sciences, 1 research institute, 1 Georgian-American bank, 2 state ministries, 6 Limited (Ltd.) companies, 1 corporation, plus growers and processors of soybeans and other oilseeds.

Objectives and activities: To develop government programs. To promote soybean, corn, sunflower, and their products. Training of farmers. Extension service. Regional meetings. Member assistance. Commercialization of crop-based industry, etc.

Publications: A quarterly newsletter titled "The World Of Soya." Note: This association has a listing in the *2000*

Soya & Oilseed Bluebook, p. 23. Address: 19, Petriashvili St., Tblisi 380079. Phone: +995 32 22 6751.

159. **Product Name:** Royal Kaviar (Vegetarian–Made from Soy Protein) [Beluga, or Osetra].
Manufacturer's Name: Royal Caviar, Inc.
Manufacturer's Address: 4551 San Fernando Rd., Glendale, CA 91204. Phone: 818-546-5858.
Date of Introduction: 2001. April.
Ingredients: Purified water, organic soy protein, organic soy oil, natural gums, sea salt, natural color, natural flavor.
Wt/Vol., Packaging, Price: 4 oz (110 gm) glass jar.
How Stored: Refrigerate after opening.
New Product–Documentation: Two leaflets from Natural Products Expo West (Anaheim, California). 2001. March 8-11. One is 8½ by 11 inches, color. On the front is a large color photo of five shallow jars of the product, with all the label text legible. On the back is information about the product and company. Website: www.royalcaviar.com. This is an alternative to typical caviar which are the eggs/roe of the sturgeon fish. The second, titled "It's finally here: Caviar for everyone!" states that Royal Caviar is the "long awaited dream of all gourmet and fancy food lovers." Label with magnetic backing (refrigerator magnet for "Beluga"). The colors of this label and the ingredients are different from the label shown in the leaflet. At the center of all labels are the words "Malosol 'Beluga." In English, "Beluga" can refer to a large white sturgeon or the caviar processed from its roe.

Talk with Ara Agadjanian, sales manager at Royal Caviar. 2001. April 23. This product was first sold commercially in early April, and is now widely available in local Armenian stores. The company was started by Armenians and they developed the product–which is patented and has a 1-year shelf life refrigerated. The president is Dr. Armen Kazanchian. They have recently had to change the name from Black Gold Royal Caviar to Royal Kaviar since Caviar can only refer to fish eggs. It retails for about one twentieth the price of real caviar. The problem is that the sturgeon is now on the endangered species list (in the "Red Book") in Russia, so Russian caviar production has dropped to one-tenth of what it was last year. Then, Beluga caviar (the most expensive) sold for $1,800/lb, but the price is expected to rise 5-10 fold. To obtain real caviar, the sturgeon fish is always killed and the belly cut open to remove the eggs. To serve Kaviar, remove from the fridge and allow contents to rise to room temperature. Lightly butter a small cracker, then top with 1 teaspoon of caviar. Enjoy.

Products with new labels sent by Ara. 2001. May 2. The words "Black Gold" have been replaced by a UPC indicia. Soyfoods Center taste test. A very creative product, consisting of hundreds of tiny black "eggs" per teaspoon. It is important to serve Kaviar as described above; when eaten straight (alone), it is too salty. An accompanying sheet shows that the soy protein in the product is ProFam 648, purchased from ADM under their documented IP [Identity Preserved] program.

160. Buker, Robert J. 2001. Edamame soybeans from Vancouver to Kampala. In: T. Lumpkin, ed. 2001. Second International Vegetable Soybean Conference. Pullman, Washington: Washington State University. 202 p. See p. 27-28.
• ***Summary:*** Dr. Al Probst, USDA soybean breeder at Purdue Univ., introduced the author to "soybeans as a green vegetable" when he was in graduate school. When he served steamed grain varieties to his children, they greatly enjoyed opening the salted pods and eating the beans with their fingers. He soon learned that they were nutritious, good tasting, and fun to eat. After 23 years of heading a program that bred grain type soybean, he resigned in 1984 and moved from Indiana to his ancestral home in Vancouver, Washington.

He then worked with USAID and introduced edamame soybeans to Uganda (where they were well accepted), Somalia and Zimbabwe. He obtained these soybeans from S. Shanmugasundaram of AVRDC. Later he started an edamame selection program in Vancouver, Washington. He also grew one variety (Buker's Favorite) in Belize and Oregon.

In 1998 he had two short-term assignments in Turkmenistan. Buker's Favorite was among the varieties planted in this cotton growing economy. This spring he received reports that this variety has been well received and production has expanded.

Buker returned to Uganda in Dec. 1998 and again in Dec. 2000. On both assignments he gave his hosts samples of his soybean variety and prepared local grain varieties as a grain vegetable snack. "In Kampala, I persuaded the hotel chef to steam some green grain soybean pods for me and invited a reporter and invited a reporter from the major newspaper to join me for a snack. He prepared a nice article for his paper on the benefits of eating soybeans as a green vegetable."

"In summary green vegetable soybeans can improve the human diet here and in the developing world. We must remember that in the developing world it is the small children that need a higher protein diet. Edamame soybeans satisfy this dietary requirement and taste good as well as being fun to eat." Address: 5808 NW Alki Rd. Vancouver, Washington. bobbuker@spiritone.com. Phone: 503-630-5984.

161. *Iowa Soybean Review (Iowa Soybean Association, Urbandale, Iowa).*2002. Farm girl travels to Afghan neighbor [Tajikistan] bearing soy for the malnourished. 14(3):27. Dec.

• ***Summary:*** In early November, Megan Puzey, an Illinois farm girl, traveled to Tajikistan to test the acceptability of U.S. wheat flour fortified with 12% soy flour among the country's malnourished. This level of soy flour can increase the protein content of wheat by more than 40%. Puzey serves as research specialist for the National Soybean Research Laboratory (NSRL) at the University of Illinois. The trials were a collaborative effort of the World Food Program (WFP), NSRL, North American Miller's Association, and WISHH.

162. *NSRL Bulletin (National Soybean Research Laboratory, Urbana, Illinois).*2003. NSRL assists in field testing soy-fortified foods in Tajikistan. 10(1):5. Feb.
• ***Summary:*** Working with WISHH, the laboratory has found that soy can serve as an excellent source to fortify the protein content of bread and other wheat-based foods–according to Pradeep Khanna, associate director of the NSRL. Primary funding for the WISHH program is provided by the United Soybean Board and the American Soybean Association. Additional funding has come from the Illinois Soybean Checkoff Board and from state soybean organizations across the USA. Since 1991, when Tajikistan gained its independence from the USSR, it has experienced a difficult period of adjustment. Two-thirds of the population lives in poverty and nearly 50% of the children under age 5 suffer from chronic malnutrition. Many of the people "depend on international food assistance from the World Food Programme [part of the United Nations] and private voluntary organizations such as Save the Children, CARE, and Catholic Relief Services," says Khanna. Research specialist Megan Puzey from NSRL traveled to Tajikistan in the fall.

Talk with Megan Puzey. 2003. March 17. She knows a young man who recently studied at the University of Illinois, was born in Tajikistan, speaks Tajik and Russian, now lives in Dushanbe, and works for the World Food Program. He is well qualified to do research on the history of the soybean in Tajikistan.

163. Wais, Asmat. 2004. Tofu and soybeans in Uzbekistan (Interview). *SoyaScan Notes.* Feb. 11. Conducted by William Shurtleff of Soyfoods Center.
• ***Summary:*** Mr. Wais, a native of Afghanistan and an experienced businessman, is thinking about starting a tofu manufacturing plant in Uzbekistan. There is presently only one such plant in Uzbekistan; it is run by a Korean man and it serves a population of about 250,000 Koreans now living in Afghanistan. He thinks that Stalin forcibly removed them from North Korea to do forced labor in Uzbekistan. He would like to buy a tofu shop that makes 1 ton/hour. He would prefer to buy tofu equipment made in the USA since OPAC, a U.S. government agency, finances 80% of U.S. made equipment purchased for use overseas.

Mr. Wais speaks good English and is an experienced businessman. He earned a degree in business administration at Michigan State University. Then he returned to Afghanistan, where he eventually owned 3 businesses, including a raisin processing plant.

Soybeans have been grown on a fairly small scale in Uzbekistan since 1991, when the country declared its independence from the Soviet Union. All land is still owned by the government; the people lease it from the government.

He travels frequently to Afghanistan and Central Asia. Most people in Afghanistan–except warlords, a few Taliban supporters, and criminals–are extremely grateful to the USA for liberating them from the Taliban. But life in Afghanistan is still difficult and dangerous. Address: 6309 Barnsdale Path, Centerville, Virginia 20120. Phone: 703-815-1360.

164. Barrett, Walter. 2005. Re: Work with soybeans in Central Asia. Letter (e-mail) to William Shurtleff at Soyfoods Center, Oct. 3. 1 p.
• ***Summary:*** In 1991, at age 44, Walter sold his ownership share of a soil testing laboratory in the Midwest. Since that time has been doing volunteer work with soybeans in Eastern Europe, Central Asia, and Afghanistan, mostly with 3 NGOs (non-governmental organizations): Winrock International, Mercy Corps, and ACDI / VOCA.

"All countries in Central Asia are somewhat familiar with the soybean but few countries, with the exception of Kazakhstan, are growing the soybean for commercial purposes.

"The soybean is most familiar among Korean communities that are scattered throughout parts of Central Asia. While in Turkmenistan, I came across a Korean lady who grew soybeans in her garden for her own use (see photos 77, 78, and 81). Note that she is cooking a native, green-seeded variety. She was one of the very few people growing soybeans in Turkmenistan before my arrival. Even now, progress is very slow because of government mandates to grow cotton.

"I work with both farmers and university researchers on soybeans. Most countries in Central Asia have a few native varieties (see attached photo 63, which shows a Tajikistan researchers with a native Tajik variety). I am guessing that most of these varieties were developed during Soviet times [before 1991]. I would like to know more about the origin of these varieties but that information is not easy to come by. I think, though, that the information would be available if one had the time and means to pursue it.

"I am a retired production agronomist, not a plant breeder. I have a lifetime of experience with growing corn and soybeans but do not consider myself to be a soybean guru by any means. I find my volunteer work in Central Asia very enjoyable and rewarding..." Address: 2804 Trent Drive, Fort Wayne, Indiana 46815. Phone: 260-484-7493.

165. Barrett, Walter. 2005. Work with soybeans in Central Asia (Interview). *SoyaScan Notes.* Oct. 4 and 6. Conducted by William Shurtleff of Soyfoods Center. Preceded by letter (e-mail) of Oct. 3.

• ***Summary:*** Walter has worked with soybeans in 4 Central Asian nations: Kazakhstan, Uzbekistan, Turkmenistan, and Tajikistan. Kazakhstan and Georgia have the most history with commercial soybean production, because Soviet planners made it happen there. They designated other Central Asian countries for cotton production, in part because cotton needs less water. Latitude is part of the reason. The climate is also very dry, so that all soybeans (and almost all crops) in these countries must be irrigated, but with river water carried by gravity. Of all the Central Asian countries, Kazakhstan has been the most successful at understanding a market economy and making it work.

Walter has many contacts in these countries. He is willing to help Shurtleff try to get a better history of soybeans in each of these countries. First, Shurtleff will send Walter an e-mail containing a table showing the dates he has for the earliest document seen showing soybeans in each in each country, and soybean cultivation in each country. Then the earliest date seen for soybean cultivation in each country. Walter will forward this e-mail to an intermediary (Winrock International or Mercy Corps), who will then mail or phone or hand deliver the message to the network of indigenous researchers Walter has developed over the years. The message will encourage them to contact other researchers who might be interested; then Walter will wait for replies.

Walter believes that Korean communities in at least four of these countries (Turkmenistan, Uzbekistan, southern Kazakhstan, and Tajikistan) were growing soybeans for their own use at an early date–probably since the early 1900s and using them almost entirely for food–such as tofu, soy sprouts, Korean-style miso and soy sauce, green vegetable soybeans, etc. The Koreans raise chickens, for example, but they forage for food and are not fed soybeans. Walter has no idea when, or, why, or how these many Korean communities came to be established in Central Asia. He has no idea where the varieties they grow came from. These Korean communities are all found within a horizontal oval that cuts across national boundaries, and includes the cities of Almaty [Alma-Ata] (in southwest Kazakhstan), Toshkent [Tashkent] (capital of Kyrgyzstan), Dushanbe (capital of Tajikistan), and Ashgabat (capital of Turkmenistan). In this area are numerous Korean restaurants where Walter has eaten; but he has no idea how many Koreans live in this area. Most individual Korean communities grew only one variety, but each Korean community had its own variety. By contrast, there are not many Chinese communities in these areas.

Walter expects his next trip to Central Asia to be in the spring of 2006–probably Uzbekistan and possibly Turkmenistan or Tajikistan. He is given drivers and interpreters by the NGO sponsoring his trip. One of the ongoing problems he faces is the limited abilities of interpreters; communication is often difficult, and it is hard to pursue agricultural or academic questions with farmers. It is less difficult with educated researchers or academicians (best is Tajikistan, followed by Turkmenistan–who might help find others). The researchers in these countries don't talk much with each other, either within a country or among countries. They have few opportunities to travel, and little access to the Internet or e-mail. This is because of government restrictions, difficulty of getting visas or money, etc. Researchers are lucky if they have a working computer, but most have a telephone and some have a cell-phone.

Of all Central Asian countries, Kazakhstan is the one in which the soybean is the most important as a commercial crop–by far. They probably have at least several thousand hectares planted to soybeans. The soybeans in Kazakhstan are run through an extruder (extrusion cooker) to make soybean oil and meal. These same extruders are also used to process cottonseed. Soybeans are grown in Central Asia largely because of the demand for meal by the local poultry industry for use in chicken feeds. Poultry is the driving force, and Central Asia is a "protein-poor" region. Walter's main reason for being there is because of poultry and (to a lesser extent) livestock; it is to help educate them about the soybean, its value for producing soybean meal and oil, and about the importance of protein. He helps farmers to grow soybeans and to develop markets for their beans. Actually, there is a ready-made market from poultry growers–who now have to pay a lot of freight to import their soybeans from Kazakhstan, Iran, Turkey, or India. The key is for Walter to serve as the bridge–to help bring the poultry growers and the potential soybean farmers together, to discover that they have a common interest, and then to work out agreements.

NGOs do lots of impact studies; they want their volunteers to work on projects that will have economic impact. They believe that increasing poultry production will have a positive impact on the economy and the people. The oil is also appreciated, and refined using modern technology within each country for use as a high-quality edible oil, sold in bottles at retail stores. Kazakhstan is about one-half the size of the United States, and is quite a progressive country with a market economy, fairly advanced education and technology. Soybeans are grown mostly in the very south. They were major crop during Soviet times (Russia was a major market for the oil and meal), but after Kazakhstan became independent in 1990, soybean production fell off to near zero. The economies off Central Asian countries plunged at about the same time (1989-91). They are now slowing getting back to where they once were.

The second most important country for soybeans (a very distant second, with maybe 300-500 hectares planted to soybeans) is the Republic of Georgia, where the western half is quite moist and the eastern half is very dry. They have a long history of growing soybeans. Walter knows of one company there that is processing soybeans using an extrusion cooker (similar to that made by Insta-Pro).

In third place might be Uzbekistan, followed by Turkmenistan, and Tajikistan–but all with only about several hundred hectares in soybeans.

Walter believes that soybeans could become a valuable double crop in Central Asia, planted after the wheat harvest in June. That would earn farmers more income, improve the soil, and break various insect and disease cycles. They need a legume in the rotation. The government does not help. They seem interested only in short term profit, keeping the status quo, and staying in power, not in innovation or long-term thinking.

In Tajikistan, he met a village farmer, Mr. Mahmadullo, who had the ability to build machines. He already had a small business making wheat flour using two motor-powered millstones. He worked with Walter to build a revolving soybean drum roaster; the outside was heated by natural-gas flames. After roasting a batch of about 20-25 kg of soybeans, he ground them into flour.

In Turkmenistan, Dr. Ashraf spent quite a bit of time working with a Korean community in the town of Dashoguz in making tofu. She also worked a lot with Peace Corps Volunteers (PCVs) in that same town; one of the PCVs was a Korean-American. Walter has not heard of any TVP being made in Central Asia; if its is made, it must be in very small quantity. In Uzbekistan, technologically the most developed, soybeans are being grown–often spread by volunteers. Address: 2804 Trent Drive, Fort Wayne, Indiana 46815. Phone: 260-484-7493.

166. Hudayberdiyeva, Mahrijemal. 2006. Re: Soybeans in Turkmenistan. Letter (e-mail) to Walter Barrett in Fort Wayne, Indiana, Jan. 23. 5 p. [Eng]

• ***Summary:*** The Institute of Botany was founded in 1957 on the basis of earlier existing botanical establishments: The Turkmen Botanical Institute (1930), Institute of New Cultures / Crops (1931), Institute of Plant Cultivation (1932), Biological Institute (1941) forming a part of the Turkmen branch of the Academy of Sciences of the USSR, and Institute of Biology of the Academy of Sciences, Turkmen Soviet Socialist Republic (AS TSSR) (1951).

In 1962 the Central Botanical Garden of the Academy of Sciences (AS) of Turkmenistan started work on introduction of leguminous plants from tropical countries of the world. Since 1972, the Institute of Botany of the Academy of Sciences of Turkmenistan has been studying legumes of tropical origin, the cultivation of crops for forage, food, industrial uses (soybean, kayan, cow pea, dolichos, etc.). Therefore a new group has been created to conduct field research and laboratory work; it includes scientists from the laboratories of geobotany and vegetative resources of the Institute of Botany of the Academy of Sciences of Turkmenistan (K.M. Muradov, chief of the group, and M.A. Ivantsova and V.N. Kazantseva–scientific employees). The experiments have been performed on the experimental base of the Institute of Botany of AS TSST in the zone of the Karakum channel, located between state farm Karadamak and the first pumping station of c. Ashgabat.

In 1962 an international exchange of different species and varieties of seeds started between botanical gardens of different countries. A table with 3 columns gives the varietal names of 29 soybean samples received from 8 countries. The columns are: (1) Catalogue number of samples at the Institute of Botany. (2) Name of soybean variety. (3) Source country or region for each sample: USSR (Kaban) (1 variety), Yugoslavia (2), Primorskiy Kray / Primorski Krai (or Maritime Territory, southeastern Russia in Asia) (1), Uzbekistan (1), France (1), Italy (1), China (7), USA (15).

All 29 samples shown in the table passed tests from 1972 to 1975. By the end of 1975 a total of 331 soybean samples had been received. During the period 1981-1985 an additional 299 samples were received. A table shows the source of these by countries or continents. The largest number (102) came from the USSR, followed by Asia (88), Europe (56), USA (23), etc. Additional details follow. Address: Asst. to acting country manager, Winrock International office, Ashgabat, Winrock in Turkmenistan.

167. **Product Name:** Re: Ethnic Koreans growing soybeans in Tajikistan or Turkmenistan, and her work introducing soyfoods to these countries (Interview).
Manufacturer's Address: Letter (e-mail) to William Shurtleff at Soyfoods Center, Feb. 18.
Date of Introduction: 2006. February.
New Product–Documentation: In Tajikistan she met a couple who lived near Dushanbe. The husband, Victor, was planning to grow soybeans. She gave him some seed grade soybeans to grow, although she had the impression that he hadn't grown soybeans before. She sensed that he wanted to grow them because of increased interest in soybeans–for reasons she does not understand. She gave him the seeds that Walter Barrett had given her, because the soybeans she had found in Tajikistan were not of good quality.

Victor led her to a Korean tofu maker, a woman who didn't speak Korean. She supplied tofu to a Chinese restaurant in Dushanbe. She told Helen that she bought her soybeans from Uzbekistan, and said they were expensive. Helen did not ask the woman when she had started to make tofu commercially or what the name of her small business was. Helen does not recall exactly where it was located.

Vera, Victor's wife, sold Korean salads at a green bazaar in Dushanbe. She and other Korean salad vendors at the

green markets sold a type of dish made from Chinese TVP, which is white in color and imported from China.

At an import supermarket called Holland Market in Dushanbe, Helen found several Russian-made TVP products and soymilk powder. She also saw soymilk sold in Tetra Pak cartons.

In Ashgabat, Turkmenistan, two Korean men came to talk with Helen at the Winrock office about a soymilk machine.

In the Dashoguz region of Turkmenistan, Helen met two different groups of Koreans (a least 30 people total) who wanted to see her presentation and demonstration soymilk and tofu production using a SoyJoy machine, along with a display of soy products such as tofu (in a Tetra Pak carton), TVP, soynuts, soy flour, soy protein isolates, energy bars, soy sauce, etc. In some presentations at farms or for women's groups (including the Korean groups), she also prepared soyfoods or Turkmen foods that included whole soybeans.

In Tajikistan, she gave 3 presentations / demonstrations: One at "Salsa Restaurant" in downtown Dushanbe, and two at a cafeteria and at the meat processing lab of the Khujand branch of the Technical College of Tajikistan. She usually ended her presentations with a meal with the participants. Her menu included Pulov [pilaf] (rice with some meat, soybeans, carrots, and onions), soup, salad, and a crepe (using a mixture of wheat flour, soy flour, and some type of local jam).

At the Agricultural University of Tajikistan in Dushanbe, and at the Khujand branch of the Technical College of Tajikistan, she gave technical presentations using an overhead projector with PowerPoint slides showing the nutritional composition of soybeans, and techniques for the preparation of traditional soyfoods and commercial products such as soy oil, soy protein, lecithin, etc.

In Turkmenistan: She gave food preparation presentations: (1) At a farm in the Mary district. (2) At apartment style homes in the cities (Mary district, and Dashoguz). (3) At the Winrock office in Dashoguz for different groups of women. (4) For 2 groups of Peace Corps volunteers in Dashoguz. "Peace Corps was interested in soyfoods because it was suspected that the protein intake of PCVs in that country was not sufficient."

While in Tajikistan and Turkmenistan, Helen did not see any soybeans being cultivated, nor an bundles of soybean plants harvested for green vegetable soybeans.

After her visit: (1) Her soy recipes were translated into the Turkmen language by Winrock staff, but (as far as she knows) they were not printed or reproduced. (2) A 30-page Russian-language brochure on soybeans was created (using desktop publishing) by a group of Peace Corps volunteers in the Dashoguz area. It included planting information and recipes, with colorful pictures and diagrams; about 200 to 300 copies were printed. The produced was funded by the Peace Corps and Helen, however Helen does not have a copy with her in Mexico. (3) Helen prepared a trip report, which is now the property of Winrock International. She did not write much about Koreans in that report.

She includes a Russian-language article on soya from the newspaper *Asia-Plus* (23 Sept. 2004, p. 4).

Note: This document mentions the earliest known commercial soy products in both Tajikistan and Turkmenistan.

168. Hymowitz, Ted. 2006. Why did the West (Europe and the Middle East) know so little about China in the 12th and 13th centuries? (Interview). *SoyaScan Notes.* Sept. 1. Conducted by William Shurtleff of Soyfoods Center.
• ***Summary:*** Because the Arabs blocked most European travel over the Silk Road / Route from about the 7th century until the 12th or 13th century. The Arab conquest blocked the overland route, in part to control the trade. There were actually two phases in the history of the Silk Road. The first phase ended in about the 6th or 7th century, before the origin of Islam.

Note: Both of these "Silk Roads" was actually a series of interconnected routes than ran from about Xian (Chang'an) in eastern China, along the northern part of China, branching into today's Central Asia, south of the Caspian Sea, through today's Turkmenistan, Iran (formerly Persia), and Iraq, to Damascus (today's Syria) and Antioch (in today's Turkey). The first famous and documented Chinese traveler, Zhang Qian (W.-G. Chang Ch'ien) led two expeditions to the Western Regions in the 2nd century BC, during the Former / Western Han dynasty.

As early as the 1st century AD, there were already some oceanic routes that were part of the "Silk Road." They hugged the coast from central China, around India, into the Persian Gulf and the Red Sea, then on to Italy!

This Arab blockade was one of the reasons for the search for a water route to China. The blockade began to fail as sea routes were developed. For example, in May 1498, Vasco da Gama was the first European to discover a sea route to India.

Another reason it took so long for information about the soybean to reach Europe from China was that the soybean is unlike rice, wheat, and maize / corn, where the product of the crop is associated very closely with what is growing in the field; everyone knows what rice, wheat and corn look like because they are so widely consumed as food. The main products of the soybean, especially those in commerce (such as soy sauce), bear no resemblance to the seed or plant from which they are made. It took a long time before Europeans realized that soy sauce (for example), which was known in Europe by the late 1600s, was made from the soybean–which did not arrive in Europe until the late 1730s. Even in Asia, the various names of the soybean were very different from the names of its major products. For example

in China: Soybean is *dadou* or *huangdou*, soy sauce is *jiangyou*, tofu is *doufu*, and soymilk is *dounai* or *doujiang*. In Japan: Soybean is *daizu*, soy sauce is shoyu, tofu is tofu, soymilk is *tonyu*, miso is miso, natto is natto, and green vegetable soybeans are edamamé. In Indonesia, tempé is tempeh. Even in the Western World today, many of these traditional foods and condiments do not have "soy" as part of their name. Moreover, the foods look totally different from the seed / bean from which they are made.

The first European to understand the connection between the soybean and its products was Engelbert Kaempfer; he made this clear in his book *Amoenitatum exoticarum...* vol. 5. Yet most Westerners did not understand this connection until more than a century later, and quite a few even today don't realize that tofu (for example) is made from soybeans.

Ted is convinced that Marco Polo and the various early Western missionaries who traveled to China probably tasted soyfoods over and over again–but they didn't realize they were made from soybeans. A good example is milk. The early Western travelers in China often mentioned that Chinese drank milk; in some cases they were probably drinking soymilk. Address: Prof. of Plant Genetics (retired), Dep. of Crop Sciences, Univ. of Illinois, Urbana, Illinois.

169. Food and Agriculture Organization of the United Nations (FAO). 2008. FAOSTAT database. http://faostat.fao.org.

• ***Summary:*** This database contains soybean production, area harvested, yield, and trade statistics for many nations worldwide, but soybean production and area are given for only six nations in Central Asia. Statistics are given in spreadsheet form.

To access this data: On top BLUE bar click Production. On #2 Green bar click ProdSTAT. On #3 light orange bar click Crops. In the Subject box: Default = Area Harvested. Or scroll down and click Production Quantity. Commodity: Scroll down and click soybeans.

According to this FAO data: Turkey was the first country in Central Asia to produce a significant quantity of soybeans. In 1961 they produced 4,500 tonnes (metric tons). This increased to 12,800 tonnes in 1972, then reached a peak of 250,000 tonnes in 1987; it gradually fell to 47,300 tonnes in 2006, the last year for which statistics are given.

In 1992 FAO soybean production statistics began to appear for five more Central Asian nations: Azerbaijan, Georgia, Kazakhstan, Kyrgystan, and Tajikistan.

Azerbaijan's production of soybeans was 400 tonnes in 1992, gradually decreasing to a low of zero tonnes in 2002 and 2003, then rising to 52 tonnes in 2006.

Georgia's soybean production rose from 400 tonnes in 1992 to a peak of 10,734 tonnes in 2005, falling to 3,813 tons in 2006.

Kazakhstan's soybean production of 11,800 tonnes in 1992 (making it the leader in Central Asia that year), rose to a peak of 48,000 tonnes in 2006.

Kyrgystan's soybean production of 878 tonnes of soybeans in 1992 decreased to 300 tonnes in 2006. Tajikistan's soybean production has always been very small, rising from 2 tonnes in 1992, to a peak of 23 tonnes in 1998, then falling to 9 tonnes in 2005.

Therefore, in 2006, Kazakhstan was the largest soybean producer in Central Asia with 48,000 tonnes, followed closely by Turkey with 47,300 tonnes. Georgia was in 3rd place with only 3,813 tonnes.

170. USDA Foreign Agricultural Service. 2008. Production, supply & distribution (PS&D) database. www.fas.usda.gov.

• ***Summary:*** Statistics are given in spreadsheet form for soybeans crushed in Uzbekistan (in 1,000 MT) from 1995-96 to 2007/08 as follows: 1995/96 = 100. 1996/97 = 100. 1997/98 = 175 (peak). 1998/99 = 120. 1999/2000 = 33. 2000/2001 = 54. 2001/2002 = 65. 2002/2003 = 70. 2003/2004 = 1. 2004/2005 = 5. 2005/2006 = 6. 2006/2007 = 5. 2007/2008 = 5.

Note: This database contains soybean acreage and production statistics for many nations worldwide, but no nations in Central Asia are included.

171. *SoyaScan Notes.*2008. Historical research on the dissemination of the soybeans worldwide: Wish list (Overview). Compiled by William Shurtleff of Soyfoods Center.

• ***Summary:*** In the record titled "Countries, overseas dependencies, and Canadian provinces in which we have no record of soya ever having been cultivated (Overview)," try to find when and where soybeans were first cultivated in each of these geographical areas.

Africa: In 1873 Prof. F. Haberlandt obtained soybeans from Tunisia. What was his source? When, how and from where were these soybeans first introduced to Tunisia?

Asia–Central: In 1873 Prof. F. Haberlandt obtained soybeans from Transcaucasia. What was his source?–Perhaps the Republic of Georgia. When, how and from where were these soybeans first introduced to Transcaucasia. Clarify when and where soybeans were first cultivated in the Republic of Georgia (before 1911, maybe before 1873), and in Kazakhstan (before 1940), and in general in Transcaucasia. Learn more about the work of G. Sturua with soybeans.

Canada–The story of the arrival of the soybean in Canada between 1855 and 1894 needs to be researched. There must be some early records, similar to those from the Commissioner of Patents.

Europe–Western: Make a good translation of F. Haberlandt's 1878 classic *Die Sojabohne*, accompanied by 2 maps of the places in Europe where Haberlandt and his

cooperators grew soybeans (one of the area in 1878 and one now; travel in Eastern Europe to get these) and a database for making a good overview: What kind of people tested the soybeans? (Gutsbesitzer, Freiherr, Schloss-gaertner, agricultural institutions, etc.). Who got the best yields and where? In Aug. 1878 Prof. Friedrich Haberlandt wrote: "In Tirol [Tyrol, Austria] the soybean is called the Coffee Bean *(Kaffebohne)* and used to prepare a coffee substitute." When and how were these soybeans introduced to Tirol?

Europe–Eastern: Write a biography of Mr. Ovsinskii (Also spelled Ovsinski, Owinsky, Ovinsky) of Podolia, Ukraine (See Sempolowsky 1900) who traveled to Asia, introduced soybeans to Russia, was the first man in Russia to grow and test them extensively, then publicize their many virtues.

USA: Write a good history (with a good bibliography) of Chinese growing and processing soybeans in California. They must have grown them between 1849 and 1899! Likewise with Japanese growing soybeans in California.

172. *SoyaScan Notes.*2008. A brief history of the Ottoman Empire, also called the Turkish Empire, and the Byzantine Empire (Overview). Compiled by William Shurtleff of Soyfoods Center.

• ***Summary:*** After the fall of Rome in the 5th century, Constantinople (earlier Byzantium) was the capital of the Byzantine Empire (also called the Eastern Roman Empire) for 1,000 years. The Byzantine Empire reached its greatest extent under its emperor Justinian I (ruled A.D. 527-565), who conquered a large part of the Western Empire and erected the Church of Saint Sophia. In about 1000 A.D. the Byzantine Empire comprised the southern Balkans, Greece, Asia Minor, and parts of southern Italy. Constantinople was sacked by the Fourth Crusade in 1204, and the Empire split up into 4 parts; it was partly restored by the capture of Constantinople by Michael VIII in 1261. It gradually lost territory to the Turks until there remained only Constantinople, Morea, and Salonika. The capture of Constantinople by the Turks in 1453 marked the formal end of the Byzantine Empire.

The Ottoman Empire was established in the 13th century by Turks from Central Asia who entered Anatolia (the part of Turkey in Asia equivalent to the Peninsula of Asia Minor, comprising about 3/5 of Turkey's provinces, and already under Seljuks or Seljuk Turks) and established a small state, traditionally ruled by Osman I (1288-1326). Beginning with Orkhan I (1326-62) an empire was organized on both sides of the Straits (the link between the Mediterranean and Black Sea, including the Dardanelles, Sea of Marmara, and Bosporus). In 1453 Constantinople fell to the Ottoman Turks, who ruled their vast Ottoman Empire from its capital in Constantinople for just over 400 years.

By the end of the 1400s, the Ottoman Empire included the Balkan region (Rumelia, Macedonia, Thessaly, Morea [Peloponessus], Serbia, Walachia, Bosnia, Bulgaria, and Albania), most of the Aegean Islands, the rest of Anatolia, and Crimea. The Empire overthrew the Mamelukes (the politically powerful Egyptian military class occupying the sultanate from 1250 to 1517; Mamluk) and secured Syria and Egypt. The Empire was at its height under Suleiman the Magnificent (1520-1566) who took Armenia, Azerbaijan, Mesopotamia and Baghdad, the North African Coast, and, in Europe, territory from the eastern frontier of the Holy Roman Empire to the shores of the Black Sea. Although Crete, Cyprus, the Arabian coasts, and the Caucasus territory were later added to Ottoman holdings, the power of the empire began to decline in the late 1500s. By a series of exhausting wars with Poland, Austria, and Russia in the 1600s and 1700s, Turks were expelled from Hungary and the northern shores of the Black Sea. During the 1800s, because of internal corruption, the steady southward advance of Russia, and the successful revolts of the Balkans, the weakened Ottoman ruler came to be known as the "Sick Man of Europe."

Serbia, led by Milos Obrenovic, gained autonomy from the Empire in 1829; in 1830 he was recognized as hereditary prince, in 1867 he secured the withdrawal of Turkish garrisons in 1867, and in 1878 Serbia became completely independent of Turkey–but without control of Bosnia and Herzegovina.

The problem of preventing too rapid a dissolution of the empire in the face of Russian advance became the "Eastern Question" of European diplomacy, and caused the Crimean War (1854-56).

After much negotiation from 1888-1899 and opposition from other countries, on 25 Nov. 1899 the Empire granted concessions to Germany for the Berlin-Baghdad Railroad. The Empire lost its African holdings of Egypt, Tunis, and Tripoli. Macedonia, its last important European territory, was lost in the First Balkan War of 1912-13. In this war, Serbia, Bulgaria, Greece, and Montenegro founded the Balkan League and defeated Turkey. Montenegro declared war on Turkey. Bulgaria and Serbia mobilized their armies, then Turkey asked the Great Powers for intervention. An armistice was signed between Bulgaria, Serbia, Montenegro, and Turkey. New boundaries were drawn in the Treaty of London (or London Peace Treaty, 1913), presided over by Britain, but all parties were dissatisfied with these boundaries.

During the second Balkan War (1913) Bulgaria attacked Greece and Serbia. Russia declared war on Bulgaria. Turkey recaptured Adrianople from Bulgaria. An armistice was signed at Bucharest. Serbia invaded Albania; a peace treaty was signed between Greece and Turkey. Serbia received territory in Macedonia.

Just before World War I, the Ottoman Empire (out of whose core Turkey later emerged) ruled what is now Syria,

Lebanon, Iraq, Jordan, Israel, Saudi Arabia, Yemen, and some islands in the Aegean Sea.

The Ottoman Empire joined Germany and Austria in World War I as one of the Central Powers and its defeat resulted in the loss of much territory and the fall of the sultanate. During the war, the Empire was an important area of conflict, as in the Gallipoli Peninsula, Mesopotamia, etc. The sultan accepted the Treaty of Sèvres (Sevres, 1920) by which the Empire gave up Cyprus, Dodecanese, Smyrna, Mesopotamia, Palestine and Syria, Arabia, Armenia, and control of the Straits.

Meanwhile, beginning with the Young Turk movement, which led a revolt in 1908, a nationalist group sought to reform the Ottoman Empire. The nationalists, under Mustafa Kemal Pasha, later known as Kemal Atatürk (Ataturk; the Father of the Turks) called a congress and set up a government in 1919 at Ankara. They repudiated the Treaty of Sèvres, defeated Greece in 1920-22, adopted a constitution in 1921 (later amended), and finally proclaimed the Republic of Turkey on 29 Oct. 1923. Atatürk sought to transform a conservative Islamic society into a secular, westernized state. The party he founded held power until 1950. In 1924 the nationalists abolished the Caliphate (spiritual leadership of Islam) and in 1928 they abolished Islam as the state religion.

Note: Asia Minor forms the western and greater part of today's Turkey This peninsula forms the western extremity of Asia, bordered by the Black Sea on the north, the Aegean Sea on the west, and the Mediterranean Sea on the south.

An asterisk (*) at the end of the record means that SOYFOODS CENTER does not own that document.
A plus after eng (eng+) means that SOYFOODS CENTER has done a partial or complete translation into English of that document.
An asterisk in a listing of number of references [23* ref] means that most of these references are not about soybeans or soyfoods.

SUBJECT/GEOGRAPHICAL INDEX BY RECORD NUMBERS