ANNOTATED

BIBLIOGRAPHY

of Walnut
and
Related Species

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FOREWORD

This bibliography attempts to cover all the technical literature dealing with Juglans ecology and silviculture and walnut timber products. It does not include popular articles or flyers, general textbooks, references on nut culture alone, or much material of a strictly taxonomic or paleobotanic nature.

The bibliography is arranged in alphabetical order by author. An index at the back provides a list of items by subject matter. More than four-fifths of the items are annotated. Most of the remainder were either not seen by the author or were in a foreign language, with no English summary or translation available.

We would appreciate being notified of any errors in the list and also would be glad to know of any publications that were omitted and should be included in a future supplement.

Our thanks are due the Commonwealth Forestry Institute and the Commonwealth Forestry Bureau, publisher of Forestry Abstracts, for their cooperation in the preparation of this bibliography. They supplied us with over 300 citations, which are the nucleus of this list.
Annotated Bibliography of Walnut and Related Species

David T. Funk

   Suggests more appropriate trade names for timber not belonging to the genus Juglans but hitherto sold under trade names that include the word "walnut".

   A tabulation of physical, chemical, and technical properties and anatomical characteristics of Juglans regia, J. nigra, and J. cinerea.


   Describes trials with 8 species (in most of which several provenances are under trial) and 2 varieties of Juglans, with data on size and frost-hardiness.

   Describes the hybrid J. silvosteppeosa (J. regia x J. cinerea) which occurred in 1925, its performance since then, and attempts to propagate it.

   A short account of the performance (growth, flowering, fruiting, etc.) of the species in plantations in the Lipetsk region, established at various times since 1927.

   Provides information on the main features of 11 hybrids derived from a crossing program involving J. sieboldiana, J. manshurica, J. nigra, and J. cinerea. All the hybrids show heterosis for growth rate and seven display good winter hardness.


   Sowing in late November just before soil freeze-up avoided seed pilferage by rodents. Nuts planted in the bottom of plowed furrows, when compared with those planted in the over-turned sod, germinated better, grew taller, and suffered more leaf spot damage of unknown cause. Black walnuts planted 1 inch deep germinated better than those planted 2 or more inches deep.

    Recognizes four log grades including cull.

11. Andronov, N. M. 1962. ／ACCLIMATIZATION IN LENINGRAD OF SPECIES OF JUGLANDACEAE／
Includes information on Juglans regia.

Recently pollinated nuts of Juglans regia were severely blighted by Phytophthora juglandis although no foliar blight or hold-over lesions were found on most trees.

Catkins are widely infected by Phytophthora juglandis with resultant contamination of pollen.


Nectria galligena Bres. infects J. nigra only through wounds extending to living tissue. The fungus can be killed by high temperature exposure; sufficiently high temperatures occur naturally in West Virginia. Planting trees on warm slopes at wide spacing to reduce mutual shading may provide natural control of the disease.

Alcides porrectrostria often ruins the entire nut harvest of Juglans regia in this region of West Pakistan.

Walnut growth is closely correlated with those properties of the subsoil—plasticity, compactness, and structure—which influence drainage and aeration. The species reacts unfavorably to either insufficient or excessive drainage. Walnut growth is not significantly correlated with degree of soil acidity or amount of chemical elements.

In 120 Juglans nigra plantations in Ohio, Indiana, Illinois, Iowa, and Missouri, those that had grown best were on soils with fair to very fast internal drainage, moderate to crumbly plasticity, friable to loose compactness, and no motting above the 14-inch depth.

Juglone is a depressant agent to unanesthetized fish, mice, rats, and rabbits.


Describes trees grown from Juglans californica seed but having many simple leaves and variable fruit. Seedling progeny of the "hybrid" trees tend to resemble J. californica.

23. Babcock, Ernest B. 1913. A NEW VARIETY OF JUGLANS CALIFORNICA WATSON. Science (n.s.) 38:89-90. /Not seen/

A new variety, Juglans californica var. quercina Babcock, was discovered in 1910 and classified then. Mutation was believed to be the cause.

Babcock rejects the possibilities of hybridization with oak, or teratological flowers, and accepts the theory of mutation of normal fruit in causing the variety.

J. californica var. quercina, a mutant
somewhat resembling Quercus agrifolia, is shown not to be a hybrid. Similar mutations have also been found in J. hindsii.


   The quercina mutant of J. californica is described as being recessive to the species type, and not related to ploidy changes.


   The F1 generation between var. californica and var. quercina shows genetic relationships. The existence of another mutation in Juglans hindsii is described.


   Recommends increased attention to Juglans regia as a timber tree.


   Describes attempts to propagate or create figured wood by mechanical treatment. Eight- and 10-year-old grafted walnut trees showed none of the curvilinear characteristic of the parent.


   The standard reference for many years, covering walnut range and supply, silvics, establishment, growth, management and yield, both of natural stands and plantations.


   Juglans nigra seeds were irradiated at 8 levels from 0 to 50,000 r,e.p. Many seedlings from irradiated nuts were reddish-orange instead of normally green; second and third leaves of several of these seedlings were distorted. Initial germination percent increased directly with radiation dose while total seedling percent at the end of the first growing season was highest for the 30,000 r,e.p. treatment.


   Juglans californica is more susceptible than J. hindsii. J. regia is very resistant.


   A systematic enumeration that attempts to cover all the species of insects and arachnids which feed on any member of the genus Juglans and to indicate type of injury caused.


   Describes quality requirements and manufacture of veneer, lumber, gun stocks, shoes, and turnery.


   Maximum vitamin C content of green English walnuts is reached about the end of July. Pickling of green nuts in syrup and sulphite solution preserves more of the vitamin C than pickling in brine or vinegar. Eating one pound per month of jam containing 10 percent green walnuts provides an adult with about one-quarter of his minimum daily vitamin C requirement.


   Pre-treatment for 2 to 4 months at low temperatures in a moist medium was necessary for seedling production in Juglans cinerea and Juglans nigra. When a sufficiently long period at low temperature (about 3° C.) was preceded by 1 to 4 months at high temperature (21° C.), germination was hastened but not increased. Good seedling stands were produced by fall planting when the seeds were protected by a mulch or a board cover. Exposure to freezing and thawing was harmful.

Juglans regia made better height growth when planted at 1 x 2 meters, as contrasted to wider spacing. The trees bore fruit in the third year and by the fourth year fruited on 51 percent of their branches.


Reviews the walnut industry, environmental requirements, varieties, propagation, culture, and pests and their control (deals mainly with nut tree practices).


Deals mainly with J. regia culture to produce nuts, but covers propagation, nursery practice, irrigation, fertilization, intercropping, and pest control. (Supersedes Batchelor's Bulletin 379 of 1924.)


The moisture relationships in semi-arid and irrigated walnut groves in California.


'Pre-season budding' (in late June in Michigan) of J. regia on J. nigra stock was successful, using a long bark slice with a portion of a leaf attached but no wood chip underneath. The bud patch when placed is entirely wrapped with a 3/4-inch-wide strip of polyethylene film.


Grafting in late May on large-stock plants transplanted earlier the same day was successful.


The authors suggest a close relationship between Juglandaceae and Salicaceae.


J. nigra silvics and performance of trees and stands in Belgium.


This fungal disease, also a fungus called leaf spot, can become epidemic during summers with high rainfall and cool temperature. Fungicides, especially Dithane Z-78, can control the disease, which causes leaf necrosis and finally defoliation.


Gnomonia leplostyla, a fungus causing anthracnose of eastern black walnut, which occurs more often in cool and rainy weather in late spring or early summer, was well controlled by zineb and almost as well by maneb.


The disease, also called leaf blotch, is caused by the fungus Gnomonia leplostyla. The fungus overwinters primarily in fallen walnut leaves and can be controlled by several fungicides, especially zineb (dithane Z-78). Eastern black walnut is more heavily attacked than Persian walnut or butternut.


Describes this virus disease, which often seriously deforms or kills Juglans in the eastern United States but has not yet been found in California.


Total lateral spread of roots of 1-year-old black walnut seedlings was 4 feet in clay, 3.5 feet in loess, and 3 feet in alluvial soil. Seven- to 12-year-old black walnut saplings developed strong taproots 4 to 6 feet long with many oblique branches spreading 3 to 6 feet and often reaching similar depths. Numerous strong horizontal laterals extended outward to distances 2 or 3 times the diameter of the crown.

Procedures for breeding Juglans regia of increased productivity and increased resistance to disease and climatic damage.

Presents an estimate of costs and returns from a walnut plantation in Colombia.

Production of inhibiting material by J. nigra and J. regia is primarily through leaf drippings and fallen leaves, but fallen catkins can also inhibit growth of tomato and tobacco plants for about 12 days followed by a period of growth promotion. Juglone content of J. nigra and J. regia leaf drippings is highest immediately after leafing out in the spring, lowest about 8 days before leaf yellowing in the fall. Tomato root development is promoted by growing plants in a nutrient solution previously used for growing J. nigra, perhaps because of inhibition of harmful bacteria.


Bud development on walnut saplings held at 14° to 20° C. until the end of December was greatly delayed. Bud development was completely inhibited by holding the plants at 14° to 20° C. throughout the winter.


Pages 365-370 describe Juglans stenocarpa Maxim., a Manchurian species, and contrast it to J. mandshurica.

Recommendations for site selection, seed stratification, direct seeding, planting stock, pruning, transplanting. Suggests that Juglans nigra may be more valuable than J. regia, and recommends mixed planting with beech, oak, and ash.

Seed stratified in a fluctuating temperature regime produced seedlings that were more vigorous and more winter-hardy than control seedlings.

This parasite wasp is well synchronized with its host and seems very effective.

A monograph covering history, taxonomy, distribution, host studies, economic importance, life stages, natural enemies, and chemical control.
   Recommends direct seeding in spring or else transplanting, establishing mixed plantations, cultivating during the first year, pruning up to 15 to 20 feet height, release and protection as needed.

   Moderate manganese deficiency in Persian walnut trees is characterized by leaf mottling somewhat similar to zinc deficiency symptoms. Severe manganese deficiency symptoms resemble those of excess boron burn. Manganese sulfate treatments were effective in reducing symptoms.

   Dusting with Hormodin No. 2 powder on the tips of the scion and over the union increased root grafting success from a maximum of 15 percent to 71 to 90 percent. The grafts were set in sawdust with only the terminal bud exposed and kept at a temperature of 65° F.

   Defects in shell formation are more frequent in years when May through September sunshine totals fewer than 1000 hours.

   Discusses climate, soils and topography, associated trees and shrubs, reproduction and early growth, sapling stage to maturity, and races and hybrids.

   Among 19 species studied, black walnut leaves are characterized by a high rate of decomposition, high nitrogen content (second only to black locust), high ash content, and the highest calcium and excess base content.

75. Brooks, Fred E. 1921. WALNUT HUSK-

   Juglans nigra is apparently antagonistic to apple, potato, tomato, alfalfa, blackberry, and other plants growing in actual contact with walnut roots. Soil pH within walnut root spread tended to be higher than outside, and the more acid the surrounding soil, the greater the pH increase beneath the walnut.

   Tomato and especially alfalfa seedlings that germinated on pieces of walnut root bark were much stunted, shriveled, and discolored as compared with seedlings germinated on apple or sumac root bark or on blotting paper. Injury to tomato plants growing in a solution containing walnut root bark can be reduced by adding increased nitrogen.

   Insect and disease pests, and the properties and various uses of walnut wood.

   Covers log grading, volume estimation, sales procedure, efficient timber cutting and log bucking, and shipping costs.


   Potting prior to grafting is better than bedding grafted plants close together in indoor grafting of J. regia as practiced in Switzerland. Two-year-old J. regia and J. nigra seedlings are used as rootstocks.
A J. regia selection from northern China is characterized by a short growing season and good resistance to both late and early frost damage as well as winter kill.

Phenological notes and a description of natural reproduction in a J. australis plantation at La Plata. Seed source was apparently northern Argentina; the trees are 12 meters tall and 40 centimeters in diameter.

Establishment and initial survival of seeded and planted oaks and seeded black walnut were very good, but nearly all trees were destroyed by rodents during the first 5 years. Growth of some survivors is fair on average sites and remarkable in sinkholes, suggesting that the biggest problem in the artificial regeneration of these species in this locality is protection from mammalian depredation.

Summarizes experiments made with walnut leaf extracts by Davaine in 1878, and reports briefly confirmatory experiments demonstrating the inhibiting effect of leaf extracts of J. regia and J. nigra on Bacillus anthracis.

Starch in Juglans regia is found only in the outer layers of the sapwood. The wood starch present is an acid polysaccharide, 90 percent of which is composed of anhydro-glucose residues; the remainder is probably glucose-glucuronic anhydride. Wood starch is suitable for feeding to larvae of Lyctus powder-post beetles.

87. Canadas Cruz, Luis E. 1963. Comportamiento de pseudoestacas de cinco especies maderables variando dosel y época de plantación. /BEHAVIOR OF STUMP PLANTS OF FIVE TREE SPECIES, PLANTED AT DIFFERENT TIMES AND UNDER DIFFERENT COVER./ Turrialba 13(4): 233-235. /English summary, p. 233./ Initial survival of Juglans boliviana planted in Costa Rica was higher under forest cover than on a grassy site.

The original standard reference on taxonomy of the Juglandaceae.


Notes on climate and soil requirements, varieties, propagation, planting methods, parasites, pruning and yield, and collection and drying of nuts.

Purified agricultural spray was the most effective of six fungicides tested in controlling Cytospora juglandis leaf spot on Juglans nigra.


Eighteen pages on walnuts, mostly J. regia. Paradox hybrid is perhaps best grafting rootstock. Cover crop suggested as possible means of overcoming inadequate soil depth. J. regia requires little phosphorus and very little potassium.

A brief account of choice and preparation of site, and planting and initial tending requirements.


In early May, patch budding was the best of four budding methods tried, but resulted in only half as much survival as grafting. Cold weather and bleeding of stocks were the most common causes of bud failure.


Seed planted in the nursery in the fall germinates faster and more completely than spring-sown seed, but prompt outdoor stratification (with attendant temperature fluctuation) produced seed better for spring sowing than did any indoor chilling treatment or delayed stratification outdoors. Planting depth affected germination date and thus seedling size, with the largest seedlings arising from seed planted 1 inch deep, the smallest from 4-inch-deep seed. To produce seedlings in 1 year large enough for use as budding rootstocks, seedbed spacing at least as wide as 6 x 6 inches is desirable.


Thomas black walnuts grown in Tennessee on J. regia rootstocks are larger than those grafted on J. ruprechtii.


Includes Juglans regia. [Not seen.]


Gives data on average diameter, height, number of trees, and distribution by diameter classes of black walnut and other species in 30-year-old plantations.


Best growth in Rumania is on sandy-loam soil 3 to 3.5 meters above water table. High soil organic content also improves growth. The best plantation studied averaged 18.4 meters tall at 23 years of age. Site index curves and form-class diagrams are included.


A number of hybrids were produced by grafting, including the following combinations: Juglans cinerea on Carya olivaeformis, and J. regia simultaneously on rootstocks of both J. mandshurica x sieboldiana and J. mandshurica x regia.


Pruning time increases directly with cleared height up to about 18 feet. Time required to remove the branches from a section of bole of a given length on small black walnut trees is the same whether the section is high or low on the bole.


Up to 75 percent of the crown was removed from 3- to 5-inch, 14-year-old black walnut trees without seriously reducing their growth. Sprouting intensity was directly related to degree of pruning and tree size.


Discusses climate, soils and topography, associated trees and shrubs, reproduction and early growth, sapling stage to maturity, enemies and hazards, and races and hybrids.


A dieback resembling sunscald has been found on planted black walnut growing on strip-mined land. This climatic injury has greatly reduced the quality of many trees in the affected area.


Ten-year pruning studies in Kansas show that as much as 3/4 of the live crown can be removed without seriously retarding growth. The possibility of epicormic branching, however, sets a practical limit to the amount of pruning that can be done.

107. Cociu, V. 1964. Selectia celor mai valoroase tipuri de nuci. /BREEDING THE MOST VALU-
Potato and tomato plants are affected within the root zone.

A fungus, probably Phytophthora parasitica Dastur, has been isolated from roots of J. regia. The disease can usually kill 12- to 18-month-old seedlings within a month after inoculation.

Gives the worldwide distribution of walnut blight.

Describes a vigorous hybrid of Juglans cinerea and J. sieboldiana.

Describes three forms of J. nigra, based largely on fruit and leaf size; one may be a hybrid.

Juglans sieboldiana pollen was stored successfully for 8 months at 0° C. and 40 and 60 percent humidity.

Includes a section on "Fundamentals in nut breeding," (pp. 871-881) that covers artificial and natural pollination, fertilization of ovule and development of embryo, incompatibility and inheritance of characters.

Variation within Juglans regia.

Under the conditions studied, F.A.S. and No. 2 Common grades should be purchased in about 30/70 ratio to best meet a requirement for 8/4 walnut material.

The disease in walnuts, serious and widespread in the south of Italy, differs in many respects from the "ink disease" of chestnuts caused by the same pathogen.

Breaking strength of intact J. nigra shells at the time of germination ranged from 28 to 33 atmospheres, J. cinerea shells about 28 atmospheres. Removal of portion of the shell over the radicle region allowed prompt germination of walnut and butternut, even at temperatures above 17° C., too high for germination of intact nuts in this test. No embryo dormancy is indicated.

Growing English walnut for timber can be much more profitable if immature trees are cultured to produce nut crops and thus earlier income.

The author warns against assuming that every late-flushing walnut tree is inherently resistant to late frost. Some trees leaf out late because they grow in sheltered locations; they are not suitable for seed collection. Walnut seed can be kept in dry storage for 20 months, even at temperatures as warm as 62° F. Carefully dried seed will still germinate the second year, even though the
kernel already tastes rancid. Nonetheless, stratifying in sand pits and sowing the
first spring are recommended for regular practice. Since both the radicle and the
hypocotyl emerge from the same end of the nut, seeds should be planted on their side,
not pointed up or down.

121. Curzi, M. 1933. La "Phytophthora
(Blephaspora) cambivora" Petri sul noce.

122. Curzi, M. 1933. La "Phytophthora
(Blephaspora) cambivora" Petri sul noce.

123. Daglish, C. 1950. THE DETERMINATION AND
OCCURRENCE OF A HYDROJUGLONE GLUCOSIDE IN
THE WALNUT. Biochem. J. (London) 47(4):418-
430, illus.

124. Daglish, C. 1950. THE IDENTIFICATION OF
THE 'APPARENT VITAMIN C' OF THE WALNUT (JUG-
LANS REGIA) WITH HYDROJUGLONE GLUCOSIDE.
The previously reported 'apparent vitamin C' of walnuts appears to be hydrojuglone
I glucoside. A second dye reductant, probably
a flavonone, is found in walnut leaves.

125. Daglish, C. 1950. THE ISOLATION AND
IDENTIFICATION OF A HYDROJUGLONE GLUCOSIDE
An amorphous compound C_{15}H_{20}O_{9} was isolated
from walnut tissue, apparently in such form
as exists in the natural plant. The com-
pound is probably the 5-glucoside of 1,4,5-
trihydroxynaphthalene.

126. Daglish, C. 1951. THE OCCURRENCE
OF ASCORBIC ACID IN THE WALNUT (JUGLANS REGIA).
Ascorbic acid and dehydroascorbic acid concentration
in walnut leaves and fruit vary widely over the growing season.

127. Daglish, C. 1951. THE SPECTROPHOTOMETRIC
DETERMINATION OF ASCORBIC ACID IN
Tissue extracts, particularly those of the
WALNUT (JUGLANS REGIA). Biochem. J. (London)
49(5):635-639, illus.
Absorption curves as affected by pH are
shown.

128. Daglish, C., and Wokes, F. 1948. HYDRO-
JUGLONE AND APPARENT VITAMIN C IN WALNUTS.

129. Dallimore, W. 1923. ARBORETUM NOTES:
THE HARDY WALNUTS. Quart. J. Forest.
17:239-245.
Performance of 10 Juglans species in
Great Britain.

130. Damanski, A. F., and PazarinecYevic, F.
1959. CHEMICAL COMPOSITION OF THE CATKINS
Paris 41:611-619. In French
Maximum content of reductones and strong
reducing substances is found during the
initial stage of bud formation. Highest
production of pentosans and crude cellulose
takes place during bud formation and at the
withering stage of the catkins.

131. Danilova, A. A. 1959. THE INFLUENCE
OF SEED PRETREATMENT ON FIELD GERMINATION,
Les. Zh., Arhangel'sk 2(1):57-56. In
Russian.
Includes Juglans mandshurica.

132. Davis, Ben II. 1963. THE MODIFIED PATCH
Describes a budding method used success-
fully with J. nigra and J. regia.

133. Davis, Ben II. 1965. NURSERY PROPAGA-
TION OF CARPATHIAN WALNUTS. Int. Plant
Recommended spacing seedling rootstocks at
1 x 4 1/2 feet to produce plants large
enough for budding in mid-August of the
first growing season. Regular fertilization
and irrigation is required to keep the stock
trees growing vigorously until after the bud
has completely united with the stock.

134. Davis, Everett F. 1928. THE TOXIC PRIN-
CIPE OF JUGLANS NIGRA AS IDENTIFIED WITH
SYNTHETIC JUGLONE, AND ITS TOXIC EFFECTS ON
TOMATO AND ALFALFA PLANTS. Amer. J. Bot.
15:620.
Juglone, or 5-hydroxy-alpha-naphtha-
quinone, found throughout the walnut plant,
is the toxic substance previously reported.

135. Davis, T. C. 1962. FOUR NEW HOSTS OF
CRISTULARELLA PYRAMIDALIS. Phytopathology
52(11):1217.
Juglans cinerea is one of them.
136. Dayton, William A. 1948. JUGLANS NIGRA
OBLONGA IN MISSOURI. Rhodora 50:147.

137. Deitschman, G. H. 1956. GROWTH OF
UNDERPLANTED HARDWOODS IN BLACK LOCUST AND
SHORELEAF PINE PLANTATION U.S. Forest
Note 94, 2 pp.

Black walnut seedlings planted under 8-
year-old black locust averaged 16 feet tall
after 8 years, but those planted under a 9-
year-old shortleaf pine stand grew only 4
feet tall in 8 years.

138. Delpino, F. 1875. Dimorfismo nel noce
(Juglans regia) e pleiotropismo nelle piante.
/Dichogamy in English walnut./ Nuovo G.
Bot. Ital. 7:148-153.  (Not seen/)

DROUGHT DAMAGE TO PRAIRIE SHELTERBELTS
IN MINNESOTA. Minn. Agr. Exp. Sta. Bull. 329,
28 pp., illus.

Charts show percentage composition of
shelterbelts by species (including black
walnut), the survival and condition by
species, the order of prevalence of the
shrub use. The suitability of black walnut is discussed under re-
 commendations.

140. Devoto, E. E. 1939. Las hibridaciones
entre especies forestales y sus frecuentes
hibridaciones naturales en nuestro país.
Psysis, Buenos Aires; 18:369-374, illus.

A natural hybrid of Juglans regia and a
Peruvian walnut is apparently resistant to
Pseudomonas juglandis.

LOCAL VOLUME TABLE FOR BLACK WALNUT (JUGLANS
NIGRA) IN STARK COUNTY, OHIO. U.S. Forest
Note 6, 2 pp.

International 1/4-inch rule volume by
d.b.h. and average height.

142. Djuval-Stroev, M. R. 1963.  /JUGLANS
NIGRA IN KRAUSODAR./ Bjul. Gi. Bot. Sada,
Moskva 50:52-57.  (In Russian/

Notes on its performance in this north
Caucasus region, based on measurements and
observations of 1,300 trees of various ages
at 16 different sites (parks, avenues, plant-
ations, etc.). J. nigra here is well accli-
mated.

143. Dode, L. A. 1906, 1909, 1910. Contribu-
Dendrol. France 1906:67-98; 1909:22-50;
1910:165-215, illus.

The only attempt at a complete taxonomic
monograph on Juglans.

144. Dodge, B. O. 1947. THE BROOMING DISEASE
112-114, illus.

The occurrence of brooming on J. siebold-
diana in the apparent absence of fungi,
bacteria, or mites seems to verify previous
reports of a virus causing the disease.

145. Dorofeev, P. P. 1949.  /THE BIOLOGY OF
FLOWERING AND FRUITING OF PERSIAN WALNUT IN
MOLDAVIA./ Priroda, Moscow 38(4):48-50.
 (In Russian/)

Rev. Eaux et Forêts 61:22-23.

A brief description of eight Juglans
species and two hybrids.

147. Ealy, Robert P. 1950. ROOTSTOCKS AND
INTERSTOCKS FORPECANS AND WALNUTS. Ass.

Neither J. rupesstris nor J. nigra root-
stocks had any dwarfing effect on grafted
Ogden walnut scions.

148. Ellis, Z. H. 1925. THE FARWEST NORTH
IN U. S., NUT CULTURE. N. Nut Growers' Ass.

Juglans nigra seedlings of west-central
Illinois provenance have thrived for almost
60 years in west-central Vermont.

149. Elwes, H. J. 1908. THE BLACK WALNUT.
Quart. J. Forest. 2:167-175.

Includes a tabulation of walnut growth in
English and a summarization by D. C. Trier
of Rebbman's 1907 article on J. regia and
J. nigra.

150. Emerson, R. A. 1906. THE RELATION OF
EARLY MATURITY TO HARDINESS IN TREES. Nebr.

Juglans nigra seed was collected in 18
states and grown in Nebraska. Differences in
date of autumn leaf drop and degree of winter
dieback were related to latitude of origin.
Trees of southern provenance held their
leaves later in the fall and suffered more
cold injury than those from northern states
or Canada.

151. Engle, L. G., and Clark, F. B. 1959. NEW
RODENT REPELLENTS FAIL TO WORK ON ACORNS AND
WALNUTS. U.S. Forest Service Cent. States
 (Reprinted in S. Lumberman 108(2489):108/)

Endrin and thiram repellents were not suc-
cessful, but it was found that spring seeding

Describes symptoms of a walnut disease and research involving experimental infection of leaves and shoots of Juglans regia and fruit of \textit{J. nigra}. Despite symptomatic and cultural differences indicated in earlier records, the pathogen was identified. Field tests indicated that the disease could be transmitted through infected pollen.


\textit{Sclerotium polsji} killed scattered 3-week-old \textit{Juglans nigra} seedlings in a nursery bed in Texas.


A historical review of work in Germany and Austria on selection of cold-hardy walnuts and walnut grafting. The Geisenheim budding method is described and recommended.


Describes growth, yield, and cold temperature damage at several altitudes in Switzerland. Walnuts have been established at altitudes as high as 1,300 meters.


Describes a canker disease caused by \textit{Dothiorella gregaria} that also attacks \textit{Salix lasiolepis}. The disease can be controlled by sanitation techniques.


/Not seen./


Gives the results of a study of age, diameter, height, and volume relationships from measurement of 72 trees aged 20-90 years.


Reports on an experiment started in 1946, using seed of different provenances on two different sites. Seed should be cleaned, stratified, and planted as soon as germination begins. One-year seedlings were used as planting stock. Root pruning is essential when they are planted out in the field which should be in groups at a spacing of 1.5 x 1.5 m. Good results are obtained on poor as well as good soils, provided that they are light and well drained. Release from competing vegetation is necessary.


A special method of saddle grafting proved best in trials of grafting \textit{Juglans regia} on \textit{J. nigra} stocks under glass.


A discussion, based on the literature, of the occurrence of the above and other substances (particularly "apparent vitamin C") in various parts of the tree, and of their biochemical significance, e.g. the function of ascorbic acid in the formation of lignin.


The author is skeptical about the suitability of black walnut rootstocks, because English walnut scions often develop poorly on them.

Discusses the reaction of Juglans regia to low temperatures. Mountain races, which have a very short growing season at high altitudes and are therefore safe from this danger, tend to shoot very early when planted at low altitudes and so are liable to damage from late frosts. Strains from low altitudes, when planted in the mountains retain their original vegetative rhythms and tend to suffer from both early and late frosts. Apparently local strains should always be used.

A study based on 8 species and several hybrids. The author’s thesis is that the shell is of intra-ovarian formation, the two valves being morphological units derived from a pair of fruit-bearing organs of the modulary parenchyma appearing on the floral axis above the level of the carpels.

A short account of the silvicultural characters and economic value of the species and its aclimatization in France, and notes on 3 plantations near Strasbourg.

A brief description of anomalies noted on J. regia cultivars on various stocks.


Treatment of Armillaria mellea infection of Juglans regia.


A description of Armillaria infections.


A literature review of the silvics of J. regia fallax and a proposal for further trials.

The inflorescences described consist of a terminal female catkin and 1 to 3 lateral male catkins—"supernumerary" catkins that flowered later than "ordinary" catkins and produced pollen until August. These inflorescences are thought to represent a throwback to an original paleobotanic type.

From a review of the literature it is concluded that J. regia is native to the flora of the Balkan peninsula, exhibiting a characteristic difference in its post-glacial forest successions from those of Northern and Central Europe.

Describes propagation and cultivation of Juglans regia in England and notes the more important diseases attacking walnut. Double-tongue grafting on young rootstocks in pots under glass in February or March is 60– to 80-percent successful.


183. Gries, G. A. 1943. JUGLONE (5-HYDROXY-1, 4-NAPTHOQUINONE)—A PROMISING FUNGICIDE. Phytopathology 33(12): 1112. (Abstr.) Juglone approaches the toxicity of copper in Bordeaux mixture. Juglone does not injure foliage when sprayed on cutinized surfaces, but it is extremely deleterious to germinating seeds.

184. Griggs, W. H. 1953. POLLINATION REQUIREMENTS OF FRUITS AND NUTS. Calif. Agr. Exp. Sta. Ext. Serv. Cir. 424, 35 pp., illus. Walnut pollen may be carried as far as a mile, but it generally is distributed effectively only within 200 to 300 feet. Top-grafting with a compatible variety is effective in increasing fruit set in strongly dichogamous varieties. Only about one tree in nine need be topworked.


190. Haas, A. R. C. 1939. ROOT TEMPERATURE EFFECTS ON THE GROWTH OF WALNUT AND AVOCADO SEEDLINGS. Calif. Avocado Ass. Yearbook 1939: 96-102. With outside temperature around 35° to 37° C., J. regia seedlings developed heaviest leaves at 24° C. root temperature, almost as large at 17° C., about 1/3 as heavy at 31° and 10° C. Fresh weight of trunk and roots grown at 17° and 24° C. root temperature was about twice as great as at 10° or 31° C; dry weight ratio was about 3/2. All plants died at root temperature of 38° C.

191. Hadfield, M. 1958. JUPITER'S TREE: THE WALNUT IN BRITAIN. Quart. J. Forest. 52(3): 181-196, illus. Ancient references to the tree and its name, and to its early history in Britain are discussed. It was probably growing in this country by A.D. 1000, and in the 16th and 17th centuries large plantings were made. Notes on the raising of the tree are given.

192. Hamilton, D. W. 1963. INTERESTING DIP- TERA COLLECTED IN INDIANA WALNUT GROVES. Indiana Acad. Sci. Proc. 72(1962): 154-157. Nine species were collected, especially Rhagoletis pomonella, the walnut husk maggot, which was destroying J. regia crops in western Indiana each year. Two malathion sprays in August controlled this pest.

thielavioides, is important only when walnuts are being grafted. The fungus grows over cut surfaces of walnut stocks and scions, preventing callus formation. The disease can be controlled by spraying the propagating house with 1-percent formalin in the spring before grafting and by painting the walnut stock with formalin before cutting it.


Includes a section on propagation, covering production of clonal rootstocks by layering, greenhouse grafting, and field budding.


They are assumed to be a form of Juglans regia.


Success rate in bark grafting Juglans regia onto J. hindsii rootstock can be increased by covering the scion with moist peat moss or by whitewashing both scion and stock.


Ascorbic acid content (dry weight basis) ranged from 4.2 percent for Juglans regia var. Mayette, to 8.3 percent for a J. nigra selection.


In 18-year-old plantations the growth of black walnut was significantly correlated with (1) the texture and depth of the rooting zone, (2) presence of motting and iron concretions indicative of internal drainage and aeration, and (3) color of the surface layers, indicative of organic matter content and possibly plant nutrient supply. All correlation coefficients were low.


With an appendix, "Croisements de noyers" by A. Meunissier, pp. 107-113.

A description of several walnut species and hybrids, especially the "Royal" and "Paradox" hybrids of Burbank, and a discussion of suitable grafting methods. The appendix is a literature review of hybrids reported since 1834.


Five Juglans species and two varieties are propagated by layering in stool beds. Covering with a mixture of 'spent' hops and sand worked well. Rooting percentage seems to improve as stools become older and vigor of annual shoots declines.


A 3.6-acre walnut stand established by seeding nuts in a cornfield now contains 384 black walnut trees ranging from 6 to 28 inches d.b.h. Original spacing was about 6 x 15 feet; stand has never been thinned. Present volume averages 5,935 board feet per acre (Boyle), and basal area is 133 square feet per acre.


Average dimensions for Juglans xylem elements: vessel member length—592 microns; vessel diameter—191 microns; fiber length—1505 microns.


Natural range of Juglans regia.


Six species of Juglandaceae studied, including Juglans nigra and J. cinerea, possess well-developed lateral sieve plates which are similar to sieve plates on the end walls. This characteristic suggests a rather close relationship to gymnosperms or vascular cryptogams.

Juglans nigra leaves and fruit were an even richer source of vitamin C than J. regia. Highest vitamin C content was in the green shells of J. nigra.


This defoliator has 5 larval instars; the first eats only the upper layer of leaf cells; the others the entire leaf. Lead arsenate plus lime spray is an effective control, as is pruning and burning branches containing clusters of larvae through the 4th instar.


Discusses the effect of seed orientation on development of straight seedlings and the effects of light, site quality, frost, and animal damage on loss of growth of terminal buds, development of lateral buds, and future stem straightness and forking.


Juglans nigra was grown from seed on three sites in southeastern Nebraska: a steep north-facing slope in a typical Tilia community; a southwest slope in a Quercus macrocarpa-Q. velutina forest; and a gentle slope near a prairie hilltop. After 3 years the walnut had outgrown seedlings of shellbark hickory, bur oak, northern red oak, and basswood on both the oak forest and prairie sites, but only the basswood survived on the basswood forest site. The 3-year-old walnut root system was more than 9 feet deep and 14 feet in diameter on the prairie site. The walnut root system combines a deep taproot with strong laterals.


Development of J. nigra in various sections of its natural range. Utilization of sapwood and rootwood.


A detailed description of flowers, root, stem, leaf, cotyledons, and the young seedling.


10.3 kg. of green Juglans sieboldiana husks yielded 2.77 g. of juglone.


Production of hybrid walnuts is described on pp. 37-42. The 'Royal' walnut (Juglans hindsii x nigra) is recommended as a timber tree.


Varietal differences in susceptibility of J. regia to Pseudomonas juglandis.


Recommends increased planting of black walnut in central Europe, discusses site selection, and suggests that on good sites growth should reach 30 inches d.b.h. and 65 to 80 feet tall in 30 to 60 years.


The disease is transmitted by means of patch-bark grafts in Juglans nigra and J. cordiformis var. alantifolia.


Differential fertilization of Juglans mandshurica with nitrogen, potassium, and phosphorus. Plants treated with highest level of P grew 3 times as well as those treated with highest level of N.


A descriptive article, including tables of paired characteristics useful in differentiating Juglans from Carvay and different Juglans species from one another.

219. Ito, K., and Kobayashi, T. 1956. //AN-


17(3):98, illus.

Includes European walnut (Juglans regia).


17(6):224, illus.

Includes American black walnut (Juglans nigra).


18(8):307, illus.

Includes butternut (Juglans cinerea).

229. Johnston, D. R. 1956. STRUCTURE DRAWINGS TO "SPECIMEN WOODS". Sheet 56. Wood

21(2):57, illus.

Includes Japanese walnut (Juglans sieboldiana).


A detailed account of morphological development of the maturing shell (mesocarp) of English walnut.

236. Karsten, G. 1902. Uber die Entwicklung
Consider double fertilization and parthenogenesis in several Juglans species from the standpoint of the taxonomic relationship of the Juglandaceae to other families.


Pollen was found to germinate 3 hr. after entering the stigmas; after 6 hr., its sperm cells entered the pollen tube where they are often separately discernible. Artificial germination of pollen was obtained on dry glass objects placed in moist chambers, starting after 5 hr. at 20–21°C. After 24 hrs., the pollen tubes reached a length of 7–9 times the diameter of the pollen grains.


Use of an excessive amount of pollen causes premature wilting of the stigmas. Ten to 18 pollen grains per stigma is optimum.


Recommends autumn collection, stratification in sand, and direct seeding on good sites in the spring.


Curves cover a site quality range from 40 feet to 80 feet at age 50.


Table based on 160 single-stemmed trees.


Describes a successful greenhouse cleft-grafting method, using 3-month-old seedlings for rootstocks.


Describes a successful ring-budding method used in the field. Mid-June budding on stock plants in their second growing season gave the best results.


Juglans regia seedlings are recommended as rootstocks for J. regia scions, as well as J. nigra understocks. Waxing of grafts is neither necessary nor desirable. Grafting at the root collar is not only unnecessary but increases the chance of rot. Grafts can be made at any other point where rootstock and scion are of like size. Late winter, early spring, and the last half of August are good times for grafting. Potting of rootstocks before grafting is unnecessary; instead, bench grafting is recommended, followed by lining out in propagating beds. These methods used for 956 grafts yielded 77-percent success. Field budding is done on 1- and 2-year-old seedlings in July and August. The ring budding method has been most successful.


Includes a historical summary of trade in Persian walnuts and a detailed description of several grafting and budding methods.

--- Khristov, Al. (See Khristov, No. 214).


A quality-class system based on clear faces on walnut logs is related to lumber yield and can be used to develop a log price structure.


Log grades based on size and clear faces and their relation to lumber yield.


The Biederman bark graft method for top-working Juglans major is described.

Large, simple leaves were common, as well as occasional pairs of compound leaflets.

250. Kljushnik, P. I. 1950. /FUNGUS DISEASES OF EXOTICS/ Les Khoz. 3(7):71-72, illus. /In Russian/
Includes Juglans regia.

Vitamin C content of walnuts reaches a maximum of 15 percent (moisture free) 40 days after blossoming, then decreases to 1 to 2 percent at maturity. At 131 days after blooming, vitamin C was distributed as follows in the fruit: hull - 52 percent, tissue underlying the shell - 32 percent, shell - 15 percent, kernel - 1 percent. The process is considered only marginally economical.

Waste green walnut hulls yield about 0.5 percent ascorbic acid from a total crystalline yield of about 25 to 50 percent. Details of experimental extraction, purification, and crystallization are given. The process is considered only marginally economical.

Poor shell development in paper-shell walnuts may be due to bird-peck damage.

Recommends use of small buds from near the base of the current year's growth.

Recommends allowing scions to initiate growth normally, then, after a week to 10 days, removing new sprouts and grafting in any routine manner.


Includes Juglans nigra.

Gallic acid, beta-sitosterol, and ellagic acid were isolated and identified, and glucose, arabinose, xylose, and rhamnose detected by chromatographic methods.

As contrasted to non-hardy plants, frost-hardy Juglans regia individuals begin CO2 assimilation earlier in the morning and contain more water during the period of intense growth; the hardy plants, however, show a greater water loss, particularly in non-bound water, at the end of vegetative growth. Short shoots which complete growth early in the season are more frost resistant than long shoots.

During the first half of the summer, the diurnal photosynthesis curve of four Juglans species growing near Kharkov was biapical; in the second half it had only one peak. J. regia had a longer period of intensive growth than the other three species, and therefore higher photosynthetic activity during the second half of the summer. Seasonal photosynthetic trends showed two peaks of activity for all four species: at the beginning and end of summer.

Selects, Leningrad (Ser. X) 2:101-108.

In Russian, English summary

Recommends areas where it should be planted.


Up to 68 percent of Juglans nigra seed germinated when planted 1 inch deep in soil, but no seed germinated when placed on top of soil or litter. All the seed was removed (presumably by rodents) from unscreened plots within 2 days.


Juglans nigra seedlings in eastern North Carolina began height growth in late March or early April, completed about 50 percent of their growth by the first of May, and completed their height growth in late July or early August after a growing season of 130 to 135 days.


Describes, with tabulated data, the root systems of oak and walnut of various ages in pure stands and mixtures on chernozem soils, and concludes that, contrary to common opinion, mixtures of the two species would be more drought-resistant and more productive than pure stands.


Describes a successful method of establishing grafted walnuts in pots in the greenhouse.


Flower and fruit morphology of J. regia.


Differentiation of female flowers begins in October, and that of male flowers in May of the year before blooming.


Supplemental hand pollination increased fruit set by about 5 percent over normal.


Suggests criteria for selecting Juglans regia in Transcaucasia for nut and timber production.


Tabulates results which show that seedlings given (a) 120 kg. PK fertilizer/ha, were shorter and more slender but suffered far less frost damage in winter in the N. Caucasus than those given(b) 120 kg. NPK/ha. + 60 tons of manure, and (c) 90 kg. NPK/ha. + 60 tons of manure + 2 waterings.


Some 3-year-old grafted trees produced fruit. Lammas shoots were produced on the fruiting branches of the young bearing trees.


There appear to be 4 active principles in fresh leaves, 1 bactericidal and 3 inhibiting the growth of Bacillus spp. The first is found in the leaves from the beginning of the season until mid-August, and the other 3 until later in the season.


Description, site requirements, varieties, propagation, culture, and insect and disease pests of Juglans regia.
   The original 'Lamb' curly walnut shows figure throughout the tree, but grafts made
   with scions from the curly parent show no figure after 18 years.

277. Langdon, LaDema M. 1934. EMBRYOGENY OF Carya AND Juglans, A COMPARATIVE STUDY.
   In eastern Maryland, J. mandshurica female flowers are visible in early May and pollina-
   tion begins about May 6. Fertilization follows in 4 or 5 days and embryo division
   6 to 7 days later. Seed coats are approximately full size by June 15 (4 to 5 weeks
   after pollination).

278. Langdon, LaDema M. 1939. ONTOGENIC AND ANATOMICAL STUDIES OF THE FLOWER AND
   The families are considered to be somewhat closely related, with the Juglandaceae
   the more phylogenetically advanced.

279. Larsen, Esther Louise. 1942. PEHR KALM’S OBSERVATIONS ON BLACK WALNUT AND
   Translation of articles by the Swedish botanist published in 1767 and 1769 describ-
   ing characteristics and uses of Juglans nigra and J. cinerea in mid-eighteenth-
   century North America.

   Pădurilor 68(8):3-6, illus. /In Rumanian/
   Includes some notes on Juglans nigra x J. regia hybrid.

281. Lebedinova, N. S., 1961. THE MOISTURE REGIME OF THE DARK BROWN SOILS OF THE SOUT-
   HERN KIRGHIZ JUGLANS REGIA FORESTS. Pochvooved.6:21-33, illus. /In Russian with
   English summary/
   Emphasis is on the water regime of soils of walnut forests. Suggests suitable cul-
   tural practices for walnut plantations.

282. Leroy, Jean-F. 1953. Notes géographiques sur les noyers tropicaux (Juglans et
   Includes a map indicating that the genus Juglans in the western hemisphere extends
   from about 50° N. latitude to 35° S.

   Ser. A. 26:357-362, illus. /In Czech, with Russian summary/
   Modified chip budding, both indoors and outdoors in early April, was better than
   grafting or ring budding.

284. Limberk, J. 1964. MAIN THING IN THE CULTURE OF WALNUT TREES. Ovocnářství a
   Zelinarství 12(9):233. /In Czech/
   Grafting J. regia.

   Describes a J. regia tree in Austria that bears as many as 13 nuts in a cluster.

   JUGLANS REGIA IN RELATION TO ADAPTATION TO NEW ENVIRONMENTAL CONDITIONS.
   Bot. Zh. 47 (5):697-705, illus. /In Russian/

287. Liu, W.-S. 1963. GERMINATION OF JUG-
   Germination percent are tabulated for 3 species on various nutrient media.

288. Lloyd, F. E. 1921. ABSICCIOSION OF FRUITS IN JUGLANS CALIFORNICA QUERCINA. Roy.

289. Logginov, B. I. 1964. PRINCIPLES OF FIELD-PROTECTIVE FORESTATION. /Translated
   from Russian to English by A. Gourevitch. Available from U.S. Dep. Commerce OTS
   6-11010, 302 pp., illus./
   Peak height increment in Juglans regia plantations in the Ukraine is reached in the
   first 10 years, but remains fairly constant at about 1 foot per year from age 15 through
   age 60. Collection zones for winter-hardy seed are listed. Irrigated J. regia plan-
   tations on good soil grow to 75 feet tall in 60 years.

290. Lopes Pimentel, Antonio Augusto. 1942. Primeiras notas para o estudo de uma doença
   do castanheiro e nogueira observada nas viveiros florestais e causada por um fico-
   riceta. /A DISEASE OF CHESTNUT AND WALNUT TREES OBSERVED IN FOREST NURSERIES AND
   CAUSED BY A PHYCOMYCETE. Serv. Florestais Port. Public. 9(2):175-187, illus. /English
   summary p. 185/
   The disease is probably Phytophthora cambivora and may be transmitted on seeds.

291. Lopushanski, P. I., and Molotkovskii, G. H. 1955. POLARITY AND DISTRIBUTION
   OF ASCORBIC ACID IN WALNUT (JUGLANUS REGIA) PLANTS. Dokl. Akad. Nauk SSSR 103:723-726,
   illus. /In Russian/
Highest ascorbic acid content was found in the root collar and in the apex of young shoots.


In all parts examined (shoot internodes, leaflets, peduncle, and pericarp) a gradient was found in the respiration rate, the basal portions always respiring more actively than the apical.


Oil content of nuts is higher on the southern side of the tree than on the northern, and increases with branch height; oil content is highest in the interior of the crown. Ascorbic acid content is lowest in nuts from the interior of the crown, highest on the north side.


Black walnut plantation in Quebec, with adequate wind protection, reached 55 feet in height and 7 inches in diameter in 37 years.


This root-lesion nematode attacks Juglans hindsii causing stunting, dieback, and chlorosis.


The growth stimulation remains unexplained.


Pterocarya and Juglans fruits are contrasted and phylogenetic relationships discussed.


Only about 4.5 to 6 percent of the 'total' ascorbic acid in ripe English walnut fruit is dehydroascorbic acid.


Presents cost estimates showing the relative economy of complete clearing of good sites, growing a rye-oats mixture in the forest openings for about 4 or 5 years, and then setting out walnut trees that have been grown in adjacent forest transplant beds for 3 to 4 years.


American walnut wood is darker than English walnut and also has a characteristic purple tinge. Heating American walnut veneer bolts before slicing causes the heartwood to become lighter and the sapwood darker. Color can also be regulated by stacking wet veneer for aging in a warm room for several hours before drying.


Leafy softwood cuttings of the Paradox hybrid walnut (Juglans hindsii x J. regia) were successfully rooted in a mist bed. The best rooting percentage was obtained with a 5-second dip in 8000 p.p.m. indolebutyric acid for cuttings taken on July 14.


But walnut can only tolerate 100 ppm (half recommended dosage) as a 24-hour dip.


Most black walnuts in Illinois are protogynous, while Carpathian varieties of Persian walnut tend to be protandrous. Several types of unusual monococious flowering in walnut are described.


Juglans trees are generally dichogamous, and climatic factors are responsible for considerable differences in flowering se-
quence of a variety in different locations.


Notes on the time of flowering of a large number of Juglandaceae species and varieties.


The use of fungicides like Ferbam and Zineb and use of polyethylene bags to protect the grafted buds from drying are recommended.


Susceptibility of species and varieties to cold-temperature damage and propagation by budding and grafting are emphasized.


Discusses causes of the formation of curly grain and problems connected with the production of curly-grained walnut logs by grafting.


Walnut datana is the larval stage of a moth which can seriously defoliate walnuts. It can be controlled by spraying DD'T or lead arsenate, or removing leaves with egg clusters or young larvae (before the final moult).


The authors present considerable evidence from the literature and their own experiments showing that walnuts are sometimes harmful to other plants growing nearby. They cannot explain this effect, but feel that a toxic substance may be produced that is quickly destroyed in the soil, perhaps by soil aeration. This quick disappearance of such toxic substance would account for the frequent reports denying walnut antagonism.


Reviews the literature on cause, hosts, range, and transmission of this presumably virus disease; discusses the appearance of symptoms in several Juglans species and in young and mature trees.


A Juglans major tree grown near sea level in California from seed collected at 8,000 feet in Arizona retains its leaves about twice as long as native walnuts at the same locality in Arizona.


Gases in the central cylinder in Juglans major may include CO₂ at a partial pressure 600 times as great as in the atmosphere with O₂ about half that in the atmosphere. Exudation pressures occur in new wood, with a maximum at dawn and a minimum at mid-day; these pressures are not "root pressure."


Juglans major, native to a region with short summers and severe winters, when transplanted to a milder climate grows actively 2 to 3 times as long as in its native habitat. Changes in morphogenesis are accompanied by variations in the nut.


Juglans major trees from two Arizona mountain provenances, one between 1,800 and 2,500 meters high and the other at about 1,000 meters, were grown near sea level in California. The high-elevation strain bore fruit beginning at age 10 and every year thereafter. Leaves develop before flowers in both the original habitat and the coastal location; however leaves emerge in late March in California versus May in Arizona. Radial growth of the young high-elevation tree in California usually began about mid-May and ended in mid-August (earlier in dry years). But at 25 years of age, this tree's growth habitat was becoming more like that of trees in its native habitat, with radial growth not commencing until June, after leaves have completely expanded. The low-elevation variety in its native habitat is characterized by simultaneous leaf and flower development, with flowers maturing before leaves have fully expanded. The tree studied in California did not bear fruit. Leaves on this tree emerged 2 to 4 weeks earlier than on the high-elevation tree. Activity of the cambium in
Juglans does not begin until leaf expansion is well advanced. In most years half of the final leaf area was exposed before radial growth began.


Development of heartwood from sapwood in Juglans californica includes blocking of all vessels by tyloses. Additionally, springwood portions of some annual rings of sapwood are also tylosed. Within annual rings that are partly or completely untysed the transpiration stream moves through the outer portion of the late summerwood and the innermost portion of early springwood, leaving an intermediate zone through which there is no conduction.


Among 23 deciduous tree species growing on limestone soil in central Kentucky, Juglans nigra foliage was above average in iron, phosphorus, and potassium content and below average in manganese.


Juglans regia varieties bloomed about 2 weeks earlier than most J. nigra varieties, but two hybrids between the two species bloomed earlier and one hybrid later than any of the pure species varieties observed.


Seedlings grown from nuts produced by a natural Juglans regia x nigra hybrid (which was probably pollinated by J. regia) all tended to bear leaves with 9 to 18 leaflets, whereas J. regia leaves usually have 7 or 9 leaflets and J. nigra 13 to 23. The hybrid progenies varied considerably in defoliation caused by anthracnose infection, but were rather consistent within progeny lines. The author suggests that polygenic inheritance governs both leaflet number and anthracnose resistance.


Gives history and symptoms of this virus disease. Japanese walnuts are most susceptible, followed by butternut and English walnut. Black walnut is relatively resistant. Complete removal of diseased trees is the only control.

321. McKay, John W., and McKay, Hazel H. 1941. MICROSPOROGENESIS IN JUGLANS INTERMEDIA CARR. Amer. J. Bot. 28:4s. (Abstr.)

The staminate catkins of two trees of Juglans intermedia produce 75 percent abnormal pollen. The somatic chromosome number is 32, but meiosis is highly irregular and the trees are very infertile. The trees are presumed to be natural hybrids of two species of walnut that are genetically unlike, probably J. regia and J. nigra.


Hot-dip pitch-asphalt end-coating and a proper kiln-drying schedule are recommended.


Phosphamidon and other compounds provided effective control against both pests.


Describes J. guatemalensis and J. steyermarkii, 2 new species from Guatemala.


Emphasis on evolutionary development; Juglans and Carya are most advanced of 6 genera in the family.


Petals are absent throughout the family.

The typical 'floral envelope' in *Juglans*
consists of a narrow primary bract, 2 brac-
teeoles, and 4 or fewer sepals. A few
species, especially from Central and South
America, have a larger number of organs in
the flowers.

329. Manning, Wayne E. 1957. **THE GENUS JUG-
LANIS IN MEXICO AND CENTRAL AMERICA.** J.
Arnold Arboretum 38(2):121-150, illus.
This taxonomic revision recognized 7
species plus 2 varieties. Central American
*J. olanchana* probably gave rise to other
Mexican and U. S. species in section *Physa-
caryon* (all those in N. America except *J.
cinerea*).

330. Manning, Wayne E. 1960. **THE GENUS JUG-
LANIS IN SOUTH AMERICA AND THE WEST INDI-
A revision, with key, based on study of
all the collections in the principal her-
baria of the world. Six species are recog-
nized (all of the section *Physacaryon*),
including *J. venezuelensis* and *J. soratensis*
sp. nov., the latter from Bolivia. A tabu-
lar comparison of the species and chief
varieties of the section *Physacaryon* and a
note on some apparent hybrids are also
included.

331. Manning, Wayne E. 1962. **BRANCHED
PISTILLATE INFLORESCENCES IN JUGLANS AND
CARVA.** Amer. J. Bot. 49:975-977, illus.
Occasional branched inflorescences, making
the pistillate flower essentially a small
panicle, represent a primitive condition.

UNREPORTED HOST OF POLYPORUS SQUAMOSUS.**
*P. squamosus*, which commonly causes a
white heart rot in elm, was collected from a
pruning wound on *Juglans nigra*.

333. Marth, Paul C., and Mitchell, John W.
1961. **GROWTH REGULATORS, STIMULANTS, AND
SEEDS.** IN: **SEEDS.** U.S. Dep. Agr. Yearbook
*Juglans nigra* trees growing in a green
house were stimulated to grow 8.5 feet tall
(vs. 1.5-foot control trees) by treatment
with 1-percent gibberellic acid in lanolin
paste. The paste was applied 3 times during
the summer in narrow bands around the stem
1/2 inch below the terminal bud.

Ergebnisse aus einem Bekämpfungsversuch
gegen die gemeine Napschildlaus *Eulacanium
corni* (Bouché) (Homoptera, Coccoidea, Leca-
noidae) an Russbäumen. **/CONTROL TESTS

**AGAINST E. CORNI ON WALNUT.** Kurzmitt.
Schweiz. Anst. Forstl. Versuchswesen 9,
11 pp., illus.
Tests in a heavily infested 11-year-old
trial plantation with Winterspritzmittel
Ciiba, a combination of mineral oils and Fos-
finon (the proprietary name for a phosphoric-
acid ester containing CI), sprayed in mid-
March, gave excellent results in concentra-
tions of 1 and 1.5 percent.

335. Massey, A. B. 1925. **ANTAGONISM OF THE
WALNUTS (JUGLANS NIGRA L. AND J. CINEREA L.)
IN CERTAIN PLANT ASSOCIATIONS.** Phytopath-
ology 15:773-784, illus.
Alfalfa and tomato plants growing in
direct contact with walnut roots wilted and
died. Tomato plants grown in water culture
containing pieces of walnut root bark were
also killed.

336. Mateescu, N. 1959. Studiul infloritului
și legării fructelor la nuc (Juglans regia L.).
**/FLOWERING AND FRUIT SETTING IN EN-
GLISH WALNUT.** Lucrăr St. Inst. Cercet.
Hort.-Vit., Baneasa-București (1957):337-364,
illus. **/Russian and French summaries,** p.
364./
In the Dâmbovița valley, walnuts flower
between April 14 and May 26 over a 14–
to
25-day-long period. The local trees are
dichogamous, flowering begins when median
temperature reaches 11° to 14° C; optimum is
11° C. Proxogynous trees were more produc-
tive than androgenous trees.

**BLACK WALNUT FOR TIMBER AND NUTS.** U.S. Dep.
Agr. Farmers' Bull. 1392, 30 pp., illus.
Guide to site requirements, uses, and
methods of planting and growing walnuts on
farms.

LeafI. 84, 8 pp., illus.
(Superseded by item No. 90.)

339. Maurer, K. J. 1950. Ein Beitrag zur
Walnuss-Freilandveredelung. **/OUTDOOR WALNUT
BUDDING.** Schweiz. Z. Obst-u. Weinbau 59:
345-348, illus.
Patch budding in May and June with breaking
buds or in July and August with dormant buds
is 80– to 85-percent successful.

340. Maurer, K. J. 1950. Möglichenheiten der
vegetativen Vermehrung der Walnuss. **/VEGE-
TATIVE PROPAGATION OF WALNUTS.** Schweiz. Z.
Shoots of 300 sorts of walnuts were layered
but roots formed only if the shoots had been
previously wired. Still better results followed wiring and mounding earth around shoots in stool beds. Varietal differences in rooting capacity were noted.


Highest percentage of shoots rooted in stool beds was obtained with J. sieboldiana, followed by J. mandshurica and J. cinerea. J. regia var. monophylla did not root satisfactorily.


Juglans nigra is preferred as a rootstock for J. regia, but J. regia, J. sieboldiana, and J. mandshurica are also used. Summer patch budding or winter greenhouse grafting are the recommended methods.


Root pruning of J. nigra seedlings in mid-June stimulates lateral root growth for the balance of the season in the nursery. Seeding at depths of 3.2 and 4.8 inches resulted in larger seedlings than when seed was covered only 1.6 inches deep.


Four species of walnuts were found to be a "remarkably rich source of vitamin C."


Veneer grafting.


/Not seen/.


DDT appears to provide effective control. Bacterial blight injury apparently makes caterpillar entry into the nuts easier after the early part of the growing season.


Systemic insecticides, systox and schradan, controlled walnut aphid better than non-systemic insecticides. Unusually high summer temperatures and low soil moisture also cause high aphid mortality.


Recommendations for control of codling moth, walnut aphid, and spider mite.


Describes several satisfactory insecticides; OMPA was most effective, but not yet cleared for commercial use.


Schradan is the most effective insecticide tested for use against the walnut aphid, Chromisphora juglandicola (Kltb.). The unusually high vigor of trees treated with schradan suggests a stimulating effect beyond that due to pest control.


Climatic and biotic factors that influence the size of the codling moth population fluctuate from year to year. When these factors combine to favor the moth, spray programs must be properly timed and thoroughly applied to control the insects.

IN NORTHERN CALIFORNIA. J. Econ. Entomol. 43(4):448-455, illus.

When abundant, the aphids injure trees by feeding on leaves; additionally, the aphids secrete large quantities of honeydew on which a sooty mold fungus grows. The fungus darkens the surface of leaves and nuts, causing them to be easily sunburned. Fourteen percent nicotine dry concentrate is recommended for control.


Describes development stages of important insect pests of English walnut in California, their life history, habits, damage, seasonal population trends, and cultural methods for insect control. Very little on insecticides.


J. sieboldiana is more susceptible than J. nigra.


Two or three sprays with Bordeaux 2-2-50 mixture provide effective blight control.


In further spraying tests against walnut blight (Bacterium juglandis) in Oregon in 1937, when the disease was moderately severe as a result of prolonged rains during the critical period of infection, almost as good control was given by Bordeaux mixture 2-2-50, 2-1-50, and 2-2-50, as by the 4-2-50 and 4-4-50 concentrations, though a concentration of 8-5-50 gave the best results. Foliage injury was generally reduced to an insignificant amount by the addition of fish or mineral oils or oil emulsions, and mixtures made with dolomite or high-magnesium lime were less injurious than those made with high-calcium lime. Injury diminished with decreasing amounts of lime until the neutral point was reached. Preliminary studies indicated that Bordeaux mixture has less effect on the transpiration of walnut leaves than on that of some other plants. Copper oxalate (2-50) was at least as effective as Bordeaux mixture (2-1-50) and caused no perceptible foliage injury, while copper oxychloride (containing 40-percent metallic copper, and used at the rate of 2 in 50) was nearly as effective and also caused no leaf injury.

365. Miller, P. W. 1941. WALNUT BLIGHT CONTROL IN OREGON. Oregon State Coll. Ext. Circ. 359, 4 pp., illus.

Spraying three times with Bordeaux mixture is recommended.


In inoculation tests with V. albo-atrum none of 10 one-year-old seedlings of J. regia showed any evidence of infection.


The resistance to Xanthomonas juglandis is apparently not related to difference in time of leaf emergence.


Walnut seedlings inoculated with the fungus showed no visible vascular symptoms.


In greenhouse inoculation experiments J. regia and J. hindii proved susceptible to infection by P. cinnamoni, whereas Pterocarya stenoptera was resistant.

Symptoms of and control for several diseases of Juglans regia as well as descriptions of and treatments for nutrient deficiencies and climatic damage.

Description and control of walnut blight and several insect pests of Juglans regia.

In planting black walnut in the Appalachian Valley and adjacent mountain regions, Minkler suggests that the following conditions should be met: Aspect—northerly slopes or well-drained bottoms with the A soil horizon over 7 inches in depth; topographic position—lower slopes, or well-drained bottoms and sinkholes; desirable soil condition—the A horizon friable, the upper half of the B horizon friable or plastic, not stiff; soil well aerated.

Notes on the fruiting (age of commencement, nut sizes, weights, and yields) of J. regia, J. sieboldiana, J. mandshurica, J. cinerea and J. nigra in the Chernigov region of the N. Ukraine.

Thirty-nine-day soaking in polyethylene glycol solution increases dimensional stability of treated gunstocks and practically eliminates splits, checks, and internal honeycomb during seasoning. Gunstock blanks are best treated while still green; they can then be dried at an accelerated rate.

375. Molotkovskii, G. H. 1955. /THE GERMIN-
Seedling vigor is increased by planting the seed upside down.

The contents of ascorbic acid in the various organs of seedlings and adult trees were determined throughout a growing season. The acid distribution in opposite parts of vegetative and reproductive organs was not uniform but polar.

Vitamin C distribution was the same in Juglans regia stems grown horizontally as in those grown vertically.

During winter dormancy, concentration of solid substances, catalase, and peroxidase increases basipetally in tree stems, and water content increases to the upper part of stem and branches. Solid content is higher at the base of each internode than at the top. A similar distribution is found in the roots, with water content increasing and dry matter, catalase, and peroxidase increasing along a gradient from the base of the tree to the root tips.

Distinguishes 10 species on the basis of appearance at 1 to 3 months of age.

Ten species of walnuts husked soon after harvest and stored in moist peat at 1 to 3° for 5 to 6 months all germinated satisfactorily.
Translation in König C. D. E. Tracts Relative to Botany Translated from Different Languages. London, 1805. /Not seen./

Compares morphology, distribution, taxonomic and geologic history, and ecology of Platyctaria, Engelhardtia, Pterocarya, Juglans, and Carya.


Fertilization follows pollination in 2 to 5 days. The embryo is the "meat" of the nut with each cotyledon consisting of two lobes divided by the major septa so that half a cotyledon lies in each carpel. The greater part of the husk of the matured fruit is the involucre, with a thin inner layer being the perianth. The shell is the greater part of the ovary wall.

Cotyledons first become evident in embryos about 0.2 mm. long, or about 15 to 20 days after the first zygotic divisions. The further development of the cotyledons is described.


A cytological study of double fertilization including observations on JUGLANS REGIA and J. nigra.


Gives diploid chromosome number of 34 for JUGLANS CALIFORNICA, J. nigra, J. regia, and a J. nigra x regia hybrid.

For several Juglans species, best results followed patch budding on J. regia stock between mid-August and early September. Mounding sand over the bud through the winter was also helpful.

Over a 6-year period, steers that grazed on a mixed grass pasture shaded by 6- to 13-year-old walnut trees spaced 25 feet apart gained 21-25 percent more weight than steers grazed on unshaded pasture.


Ultrasonic waves caused temporary dwarfing or dauermodification of walnut seedlings which had their buds exposed. Contortion and curling of leaves ceased after 1 year, and after 7 years growth rate increased to approach the normal rate.


Describes appropriate soil and microclimatic situations, and culture in stands and as single trees.


Recommends J. cinerea as grafting stock for J. regia. Gives instructions for extracting juglone for use as a cathartic.


In the Moscow region winter-hardiness decreases in the order J. mandshurica and J. cinerea, J. nigra and J. cordiformis, J. regia. The last also shows wide variation in winter-hardiness.


A positive relation was found between osmotic pressure of plant sap and winter-hardiness in J. mandshurica, J. cinerea, J. nigra, and 3 varieties of J. regia. The level of osmotic pressure corresponds to the refractive index of the sap.


Juglans mandshurica x regia hybrids in Latvia are vigorous, early-fruiting and winter-hardy.


For a number of Juglans progenies, protoplasmic differentiation, onset of convex plasmolysis, peri-plastic lipid layers, and starch-sugar conversion were all related to winter hardness.


Juglans sieboldiana from Tokyo acquired greater earliness and improved winter hardiness; the changes are heritable.


Development of hybrids among Juglans regia, J. cinerea, J. nigra, and J. sieboldiana was strongly modified by growing in two quite different climates.


Considers 5 Juglans species.


413. Pammel, L. H., and King, C. M. 1918. THE GERMINATION OF SOME TREES AND SHRUBS AND THEIR JUVENILE FORMS. Iowa Acad. Sci. Proc. 25:291-340, illus. The first 3 or 4 leaves following germination of J. nigra are often simple and, in J. cinerea, scalelike; subsequent leaves are all compound.


416. Paul, B. H. 1963. THE APPLICATION OF SILVICULTURE IN CONTROLLING THE SPECIFIC GRAVITY OF WOOD. U. S. Dep. Agr. Tech. Bull. 1288, 97 pp., illus. Black walnut is semi-ripenous. Wood of open-grown trees was somewhat heavier than that of forest-grown trees corresponding with a more rapid diameter growth of the former. Sapwood has a lower specific gravity than heartwood in both open- and forest-grown trees. Two reasons are suggested; retarded growth in recent years, and presence of infiltrated materials in the heartwood. No significant shrinkage differences were found between specimens of open- and forest-grown black walnut. As a rule, sapwood shrinkage is somewhat greater than that of adjacent heartwood.

417. Paxton, J. 1963. PATHOLOGICAL ANATOMY OF WALNUT BRANCHES INFECTED BY HENDERSONULA TORULOIDEA. Phytopathology 53(10):1141. (Abstr.) Germinating conidia cannot penetrate uninjured periderm. Inside the periderm hyphae pass inter- and intracellularly (commonly through pits) through cortical and phloem cells, causing little initial reaction, but later the penetrated cell walls show signs of dissolution, possibly through the enzymes, cellulase, xylanase, pectinase, and amylase produced by the fungus.

418. Paxton, Jack D., and Wilson, E. E. 1965. ANATOMICAL AND PHYSIOLOGICAL ASPECTS OF BRANCH WILT DISEASE OF PERSIAN WALNUT. Phytopathology 55(1):21-26, illus. Hendersonula toruloidea germinated poorly on uninjured Juglans nigra branches, and spores that did germinate did not penetrate the uninjured periderm. Where periderm was broken and moisture and temperature high, germ tubes grew directly through or between cell walls, eventually causing plugging of xylem vessels by gumes and tyloses. At concentrations occurring in walnut bark, hydrojuglone glucoside inhibited germination and growth of H. toruloidea spores in a basal medium.

419. Pazarincevic, Jevrosima K., and Damanster, Aleksandar F. 1962. /CHEMICAL EVOLUTION OF NON-NITROGENOUS SUBSTANCES IN THE NUTS OF JUGLANS REGIA L. DURING GROWTH AND SENESCENCE/. Bull. Soc. Chim. Beograd 27:23-25. /In Serbian with French summary, pp. 34-35/ In initial stages of growth, strong reducing substances and enediol compounds were present, but they decreased with an increase in cellulose and pentosans content, which reached a maximum when the fruit became heaviest and largest. Maximum ascorbic acid content was correlated with maximum water content.


the soft inner bark that closely correspond to the wood beneath.


The method of ground preparation had little effect on the success of direct seeding. Of the eight species tested, only black walnut and red oak showed promise.


Describes experiments with various chemical soaking treatments and recommends for Juglans regia: MgCl₂ (30 g./litre; 12 hr.), KNO₃ (10 g./litre; 12-24 hr.) or KNO₃ (0.01 g./litre; 12 hr.).

426. Pokorný, J. 1952. WALNUTS. Les. Knihovna (malá knída) 18, 85 pp., illus. /In Czech./ /Not seen/


Highest peroxidase activity was found in the leaves, lower in the bark, and lowest in the wood. One-year-old trees had higher activity than 2-year-old trees. Activity in the leaves was highest during growth, gradually declined, and then increased in early autumn.


In Kiev, chloroplasts are agglutinated during the winter in the bark of 1-3-year-old branches of mature Juglans regia, J. cinerea, and J. nigra. In the spring these masses of chloroplasts are broken up into smaller units with a simultaneous decrease in the amount of chlorophyll. New chloroplasts are formed in May.


A destructive disease affecting trunk, crown, and roots of Juglans regia in Argentina is apparently caused by Phytophthora citrophthora.


The disease is caused by a Phytophthora and can be easily controlled in its early stages by use of a fungicide.


Color and figure of Juglans regia typical in various areas of Europe and the Near East. Uses of J. regia and J. nigra timber.


Climatic and fungal damage and treatments.


Male and female flowers mature about 10 days apart, regardless of their order of development.


At each of 3 depths (4, 8, and 12 cm.) 100 nuts of each of 3 sizes (small, medium, and large) were sown. Best germination was obtained at 8 cm., and the largest and most vigorous plants grew from the large nuts.


Juglans regia contained the most vitamin C of any walnut species examined—as much as 1500 mgm. per 100 gm. of unripe fruit. Nonetheless, 5 other Juglans species contained from 410 to 860 mgm. vitamin C per 100 gm.

Larvae bore holes up to 1 inch in diameter and as deep as 4 to 5 inches into the stem.

Includes some yield data on a J. nigra stand aged 32 years which showed little or no injury of any kind.


Silvics and nursery and plantation culture, including a summary of performance in 41 plantations (mostly in Germany) from 30 to 120 years old. (See also item 149.)

For Juglans nigra, recommends prompt hulling and cool dry storage for several days, followed by overwinter stratification in sand pits. Seed should be sown in the spring in a horizontal position, not with the point down.

Reviewed in Forestry Quarterly 12:102-105 (1913). To avoid transplant shock, Rebmann recommends direct seeding, using just-sprouted seed. With cultivation the trees average 11 feet tall in 5 years, 35 feet in 18 years. Because of slow healing, he recommends pruning only small branches.

Plantation spacing and the need for corrective pruning following late frost damage to seedlings.

Decline perhaps due to poorly drained soil in lowland plantations.

Less detail than preceding paper.

Process of grafting walnut trees to get desirable planting stock.

Describes natural and artificial walnut hybrids including Juglans regia x J. nigra, J. regia x J. cinerea, J. sieboldiana x J. regia, J. sieboldiana x J. cinerea, and J. nigra x J. regia.

The outer husk only partly covers the fruit, but the parent tree is not a hybrid. Neither is pollination by nearby hickory trees the cause of the abnormality.

Describes 6 aphid species attacking hickory and walnut in Canada, and gives a key. A new species, Moniella microsetosa, is included.

Recommends 24' x 24' spacing. Discusses problems with green measuring worms and some type of chewing insects before canopy closure.

Slow-growing white-cedar did not compete seriously with black walnut. Recommends walnut spaced 12 x 12 feet, surrounded by cedar to be removed in early thinning.

/Not seen/


Reports on the establishment of about 2,000 acres of plantations on wholly or partially levelled spoil banks, about 13 years previously, using seed of native bottomland walnut. The trees grew satisfactorily and produced seed after 8 years.

455. Roig y Mesa, Juan Tomas. 1914. THE CUBAN WALNUT (JUGLANS INSULARIS GRISEB.) Modern Cuba 2(8):38-42, illus. /In English and Spanish.


A history of introduction of J. nigra into Belgium, silvics, nursery practice, plantation establishment, and care.


Preparations of new varieties and hybridization of walnuts, elms, and poplars.


Studies of nine varieties and their ungrafted seedlings showed that in each case the progeny differed from the mother tree and differed among themselves in phenological and morphological features, including nut characters. Protagony and protogyne could be observed within the same family.


Seed of Juglans nigra and J. cinerea would not germinate in the greenhouse without stratification. The deeply two-lobed cotyledons do not emerge above the soil during germination nor do they appreciably decrease in size. The large seedling tap roots and leaves with successively greater numbers of leaflets are described.


A description of Phytoponas juglandis and its control with Bordeaux spray.


The antibiotic proved to be both bacteriostatic and bactericidal in vitro, but in vivo treatment by stem injection was not effective, presumably because the drug was diluted in the sapstream.


A 0.9-acre plantation of Juglans nigra planted in 1910 and thinned 3 times contains 113 trees per acre and 1,878 cubic feet of volume per acre after 45 years.


In experiments on dormant cuttings of Juglans regia treated with (a) X-rays and/or (b) IAA, (b) alone, but not (a) alone, resulted in callus formation on a small percent of cuttings, but (a) accelerated callus formation on (b)-treated cuttings. The histology of callus formation was similar in both species. Irradiation of buds at 10,000 R caused their death; at 4000 to 10,000 R, lateral meristems were formed and leaves were missmashen.


Phytoxide extracted from walnut regard secretary and motor functions in small intestines of dogs and rabbits, perhaps through effect on intestinal micro-organisms.


Some Juglans nigra x regia hybrids combine Phytophthora resistance with vigor.


The formation of aposporous embryos from nucellar cells was observed in isolated female flowers. In many flowers the nucellus contained no embryo sac. The trees in the Geisenheim collection fell into the following three types: A, those with only a slight tendency towards apomixis; B, those which in some years form a high percentage of well-developed fruits when isolated, but in other years none; and C, those always able to set fruit when isolated, the percentage varying from year to year. Apomixis in isolated flowers was also observed in J. nigra, but in this species the percentage of empty fruits is much higher. The greater frequency of apomixis in central European material than in French walnuts is probably related to climatic differences.


Juglans regia pollen contains sucrose, glucose, fructose, and probably invertease.


473. Schneiderhan, F. J. 1927. THE BLACK WALNUT (Juglans nigra L.) AS A CAUSE OF DEATH OF APPLE TREES. Phytopathology 17:529-540, illus. Thirteen examples of apple trees apparently killed by walnut trees at distances of up to 80 feet, averaging about 50 feet. The Stayan variety of apple may be resistant to walnut toxicity.


Culture of Juglans regia, with primary emphasis on nut production. Includes sections on varieties; propagation by seed and grafting; spacing and intercropping; soil and climatic requirements; economics; insect, disease, and winter injury; and timber production.

475. Schneiders, Erich. 1948. Schwarznuss in Forst und Landschaft. THE BLACK WALNUT IN FORESTRY AND AGRICULTURE. Berlin: Sieben- eicher 72 pp., illus. A manual on the culture of Juglans nigra in the forest and in roadside or specimen plantings. Includes sections on silvics, site selection, planting, growth, cultural practices, yield, valuation, and production of nuts as well as timber.


Primarily culture of Juglans regia for nuts, but includes silvics and developmental morphology of seed and seedlings.


478. Schreiber, M. 1934. Bestandesweiser Anbau der Schwarznuss. CULTURE OF BLACK WALNUT STANDS; Wiener Allg. Forst-und Jagdzeitung 52(9): 41-42. The author is skeptical about mixed planting of Juglans nigra and other species except for the possibility of introducing shade-tolerant species beneath walnut stands to help reduce bole sprouting.

The answer seems to be "yes".


*Juglans regia* var. 'Franquette' produced progeny averaging 133 cm tall at age 3 when pollinated by *J. nigra* var. 'Stabler'. When another black walnut tree was used as pollen parent the progeny averaged only 60 cm tall.


*Juglans hindii* rootstocks in*Persian* walnut orchards were almost completely infected with endotrophic mycorrhizae regardless of soil depth or fertility. The fungi are presumed to be indigenous.


Soil suitability and frost damage susceptibility of *J. nigra*.


Yield of young plantations in Germany.


A listing of tree species found associated with *J. nigra* in several areas within the natural range.


Natural range and soil and altitudinal limitations of occurrence of *J. nigra*.


Suggests regions in Europe where climate is similar to the area in America where walnut grows best.


It should be possible to select suitable sites for planting *Juglans nigra* in Austria.


Stratification is necessary.


Compares regions of Germany to areas within the natural range of *Juglans nigra* in terms of altitude, length of growing season, average growing season, and midsummer temperatures.


Natural range, flowering, fruiting, seed germination, and seedling development.


Technical properties, mineral content, and anatomy of *Juglans nigra* wood.


Silvics, with recommended altitudinal limits for planting in different areas.

494. Selbert, Russell J. 1950. **A BLACK WALNUT (JUGLANS NEOTROPICA) FOR CENTRAL AMERICA.**

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Ten years after planting, direct-sown Juglans nigra was significantly taller than were planted trees, with a mean height of 6.6 vs. 5.3 ft., but showed no significant difference in form or survival. Inferior growth of planted stock was attributed to damage to the taproots in transplanting, with subsequent development of lateral roots and impaired ability to reach moisture on a dry sites.


When planted in mixture with black locust, black walnut showed impaired survival, growth, and form. When planted with other species (bur oak, sycamore, redbud, green ash), however, walnut grew almost as well as in pure stands. Mixed plantings are recommended because they usually result in better trees.


A review of taxonomical papers.


Describes 1-year leafless shoots of 7 species, and constructs a key for them.


Juglans regia characteristics and Italian timber production, import, and export data for the late 1930's.


Seedlings were planted in the bottom of a 6-inch-deep trench, at an angle of about 45° with the horizontal. As soon as buds started, the trees were staked flat in the bottom of the trench. Buds on the upper side were the only ones that grew. As the shoots grew, the trench was gradually filled with potting mixture, keeping the level just a little below the growing tips. The shoots from the layers averaged 40 inches in height by the end of the season. In December there was an average of almost four roots growing on or near the base of each shoot. These roots averaged about one-sixth inch in diameter.


The effect of blackline, the death of a narrow strip of cambium and bark at the union of Juglans regia top and rootstock, indicating a delayed incompatibility between them, is discussed and illustrated. Salvaging methods are described.


Juglans regia orchards growing on soils derived from obsidian suffered from leaf burn, and foliage contained only about half normal phosphorus content. Surface applications of triple superphosphate are not always effective in correcting such deficiencies, because much of the phosphorus is fixed by the soil.


Symptoms of and treatments to correct deficiencies in nitrogen, zinc, boron, manganese, iron, potash, copper, phosphorus, and magnesium.


Two Juglans regia orchards in California showed yellowing, bronzing, and burning of leaves, weak growth, branch dieback, and other symptoms of phosphorus and calcium deficiency. Treatment of a young orchard with 25 to 50 pounds of triple superphosphate per tree improved foliage and growth; 50 to 100 pounds of triple superphosphate per tree improved foliage and nut yield of mature trees. Check trees remain in poor condition in both orchards.


The 'Paradox' hybrid (Juglans hindsi x regia) is more resistant to lesion nematode injury than any of 11 other Juglans species tested.

507. Serr, E. F., and Forde, H. I. 1956. WALNUT BREEDING. Amer. Soc. Hort. Sci. Proc. 68:184-194. Progenies obtained from selfing and crossing Persian walnut varieties indicate that factors such as time of leafing, number of pistillate flowers produced, nut size, kernel weight, and maturity date are controlled by multiple gene inheritance. Pollination techniques are described.


511. Shchepotiev, F. L. 1951. /REEDING FROST-RESISTANT FORMS OF JUGLANS REGIA./ Tr. Inst. Les. 96:5-114, illus. /In Russian/ Reviews work in the extension of walnut-growing to central and northern regions of Russia by (a) selection of J. regia seedlings for frost resistance, and (b) hybridization of J. regia with J. nigra, J. mandshurica and J. cinerea.


513. Shchepotiev, F. L. 1955. /LAMNAS SHOOT GROWTH AND SECOND FLOWERING IN JUGLANS REGIA./ Bot. Zh. 40(1):116-125. /In Russian/ With particular reference to anomalies in leaves and flowers, including the production of bisexual flowers. Second flowering is common in years with late spring frosts, which damage the ovaries of the first normal flowering.

514. Shchepotiev, F. L. 1960. /DISTANT HYBRIDIZATION OF SPECIES OF THE GENUS JUGLANS L. IN THE UKRAINE./ In: Distane Hybridization of Plants and Animals; 140-154. /In Russian/ Hybrid walnuts Juglans regia x cinerea, J. regia x nigra, and J. cinerea x mandshurica are all more winter hardy than J. Regia.


518. Shilova, N. V. 1963. /STRUCTURE OF JUGLANS REGIA SCALES AND LEAVES AND THE PERIODICITY OF THEIR APPEARANCE./ Tr. Bot. Inst. Akad. Nauk SSSR Ser. 4, 16:101-113. /In Russian. English summary./ J. regia scales differ from leaves by a more prolonged plastochrom and a slower tissue differentiation. Scales are formed at lower temperatures, in mid-June, while leaves are formed at higher temperatures. True scales develop from the whole leaf primordium; the first signs of specialization can be seen in 90-micron embryos.


illus. /In Czech, Russian and German summaries, pp. 78-79./

In Czechoslovakia, 4-year-old Juglans nigra seedlings were as much as 4 meters tall. Most height growth took place in June, but the period of rapid growth extended later into the summer in Moravian plantations.


Investigates the morphology and ontogeny of the root system of young and mature J. nigra trees at different sites in Czechoslovakia, including the extent of root formation at various depths down to 260 cm.


Scion wood 2 or 3 years old callused better when grafted than did older or younger scion wood. Similarly, scions from 3/8 to 5/8 inch in caliper gave better results in grafting than those larger or smaller. Best callusing and graft union formation took place at temperatures between 25° and 30° C.


Artificial inoculations with Phytophthora fungus apparently responsible for walnut crown rot yielded 82 percent positive lesions on Juglans regia, 80 percent possible lesions on J. californica, and 50 percent on J. hisdisi. Four other Juglans species were also susceptible.


The disease, probably caused by Phytophthora cactorum, is especially damaging to Juglans californica and J. hisdisi used as rootstocks for J. regia. Artificial inoculations also caused lesions on 7 other Juglans species and the 'Paradox' hybrid.


Describes several species, hybrids, and varieties of walnut; cultural practices in the orchard and nursery; and propagation. Diseases, particularly walnut blight or bacterialosis, including a technical study of the disease organism, are considered at length.


Several fungi of the genera Pythiaceous and Phytophthora, which cause crown or trunk cankers on nursery and orchard black walnut, should perhaps be merged into the genus Pythium.


Juglans in California history.


On ordinary pasture, not very productive in the area, the introduction of widely spaced black walnuts should cause no injury and in many cases would improve forage, whether measured in terms of species, yield, composition, palatability, or seasonal distribution. In highly productive white clover-Kentucky bluegrass pasture, addition of trees would cause considerable injury. The beneficial effect of walnut trees on pasture is ascribed to the moderating influence of light shade, remineralization of surface soil through leaf fall, and tree root competition with deep-rooted weeds but not with grass.


The author recommends: (1) Cut back walnut seedlings to 4-inch height at the end of 1 year in the nursery. (2) Early in July (along the southern shore of Lake Erie) wound the stock plant with the Jones patch budding tool at a point several inches above the beginning of new growth. Do not remove the bark patch. The wounding promotes callus formation. (3) At the same time, select bud sticks and cut off leaves close to the first 5 good buds on new growth. (4) About 3 weeks (in dry season) to 5 weeks (in wet years) later, cut again and remove the bark patch from the previously wounded location on the stock. The cut petioles will now have ripened and fallen off the bud stick, and buds with hardened bark can now be cut, placed, tied, and waxed.

Damage to walnut trees in February 1956 was dependent not only on low temperature during that month but also on warm temperature during the preceding month. The greater the difference between the January maximum and the February minimum, the greater the damage.

531. Sobek, Josef. 1958. /ÜBER DEN PROFIT- 
ABILITY OF GROWING JUGLANDS REGIA IN 
Zeměděl. Věd. 4(3):293-303. /In Czech./
Analyzes data on yields and frost 
damage in Czechoslovakia and on this 
basis suggests where plantations, small 
groups of trees or avenues, and only 
individual trees should be established.

532. Sobek, Josef. 1958. /WALNUT-GROWING 
REGIONS OF CZECHOSLOVAKIA/ //Sb. Česk. 
/In Czech, with German summary./
Compares the temperature, light, mois-
ture, and soil conditions of Czechoslovakia 
with those of other successful walnut-growing 
countries, and on this basis divides 
Czechoslovakia into 4 zones--ranging from 
one where large plantations of walnuts could 
be established, to one where walnuts should 
not be planted at all.

533. Sommer, Noel F. 1955. /SUNBURN PREDI-
SPOSING WALNUT TREES TO BRANCH-WILT. 
The fungus Hendersonulula toruloides Nat-
trass is only weakly parasitic on normal 
branches of vigorous Juglandis regia trees 
but causes serious cankers on branches that 
are only mildly sunburned. Whitewash applications 
effectively reduce canker develop-
ment, apparently by preventing sunburning.

534. Sommer, Noel F. 1956. /SPORULATION OF 
HENDERSONULULA TORUOIDEA IN PERSIAN WALNUT 
(JUGLANS REGIA) XYLEM. Phytopathology 
46(1):27. (Abstr.)
The fungus gains entrance to susceptible 
tissue through wounds and sporulates in the 
xylem vessels. The spores can move through the 
vessels.

535. Sop, L. 1958. /RESULTS OF INVESTIGA-
TION INTO THE VOLUME AND STEM FORM OF J. 
NIGRA/ //Erdo 7(7):262-274. /In Hungarian/
/Not seen./

536. Španovic, T. 1954. /THE BLACK WALNUT 
TREE--JUGLANDS NIGRA L/ /Shumarstvo 7(1): 
37-46, illus. /In Serbian, with English 
and German summaries./
The most important North American exotic 
grown in Yugoslavia is the black walnut. 
It grows best on good quercus robur sites, 
reaching a height of 25 to 30 meters.

537. Spence, Howard. 1924. SOME NOTES ON 
NUT GROWING IN THE NORTHERN UNITED 
Gives brief history of walnut cultivation 
in the Western U. S. and notes on some in-
sect and disease pests--particularly on nut 
trees.

538. Spjicvic, T. 1954. /JUGLANS NIGRA./ 
Shumarstvo 7(1):37-46, illus. /In Serbian, 
with English summary/
Describes and lists the chief stands of 
Nigra in Yugoslavia, with some data on 
propagation, growth, and increment; and 
advocates conducting detailed studies on 
this valuable species.

Contribution a la phytochimie du pericarp 
de Juglandis regia L. Phyton 2(1/3):1-7,
illus.
An unusually large proportion of reducing 
substances was found.

540. Stanescu, C. 1960 /J. REGIA IN THE 
PLOESTI DISTRICT OF ROMANIA./ Rev. Padurilor 
75(7):403-408, illus. /In Romanian, with 
English summary/
Describes the natural occurrence of the 
species, and successful experiments in 
planting it in mixture with poplar, oak, and 
other hardwoods. Concludes that it may be 
grown successfully as a forest tree in this 
region, at altitudes of 500-500 m. according 
to the aspect of the site.

541. Stark, Eric W. 1953. WOOD ANATOMY OF 
THE JUGLANDACEAE INDIGENOUS TO THE UNITED 
STATES. Purdue Agr. Exp. Sta. Bull. 595, 
42 pp., illus.
A description of native Juglans and Carya 
woods including specific gravity, and vessel, 
fiber, and ray dimensions.

INVESTIGATIONS ON GROWTH AND METABOLISM 
OF PLANT CELLS. IV. EVIDENCE ON THE ROLE 
OF THE COCONUT MILK FACTOR IN DEVELOPMENT. 
The watery endosperm of coconut contains 
the growth-promoting factor at all stages of 
development. Analogous activity is found in 
the endosperm of Zea mays, immature fruits 
of Juglans regia, and the young gametophyte 
of Ginko biloba.

543. Stolarov, M. V. 1960 /ISOPOHIA REDTEN-

Includes vegetative propagation and pollination.


Range, description, silviculture, and wood properties. The species is much hardier than _J. regia._


Circassian walnut (_Juglans regia Linn._) characteristics, supply, and utilization.


Differentiates _Juglans major_ and _J. microcarpa_ on the basis of morphological characteristics, range, and habitat.


Presents a table illustrating population fluctuations on leaves of _Juglans regia_ throughout the year.


In the presence of chloroplasts and light, juglone participates in the Hill reaction as a hydrogen acceptor. Conversion of juglone into hydrojuglone is controlled by ascorbic acid and ferrous ion concentration.


After one good growing season, seedlings averaged 14 inches tall; the largest was 18 inches. Tap roots were up to 18 inches long.


A study of fossil material leads to the conclusion that _J. hindsii_ is indigenous in this area.


In studies on 15- to 17-year-old trees grown on silt loam, positive correlations were found between site index and soil depth, pH, available N, K, and Ca, and negative ones with Fe and Al content. Positive correlations were also found between site index and content of Mg, K, and N in leaves.


In the southeastern Iowa area studied, an inadequate supply of calcium and/or potassium appeared to be the most important factors associated with poor walnut growth.


Describes grafting techniques, desirability of native Arizona walnut rootstocks, and orchard cultural practices.


_J. hindsii_ is apparently resistant to attack by this nematode.


All _Juglans_ species examined had a diploid chromosome number of 32.


Covers the history of investigations on _J. regia_ in area, its distribution, systematyc, biological features, ecology, and forest types, and the history of the forests.


T-budding of _J. regia_ can often be done throughout the summer in Washington, provided the vertical bark cut of the T is extended...
well below the bud to allow adequate sap drainage.

Describes a specimen of Juglans regia 6 m. high at Karakum, Ferghan province, that flowers in May/June (i.e., 30-40 days later than usual), and might be useful in breeding of late-flowering forms with a view to wider cultivation of this species. On this plant the fruit was on shoots of the lowest buds formed the previous year.

Direct seeding of Juglans regia is recommended for Moldavia. In the spring, stratified seed is sown 6 to 8 cm. deep; in autumn, nuts treated with BHC for rodent control are sown 10 to 12 cm. deep. Deadwood pruning should be done in July or August.

Includes growth data for J. regia in a 4-year-old shelterbelt on the Beltsy steppe, with alternate pure rows, at 2.5-m. spacing, and also sown direct in nests of 3 seedspots, the nests spaced 3 m. apart. Very brief notes are also made on some other young plantations of J. regia in Moldavia.

Replicated experiments showed that the highest germination percent and best seeding development occur when the suture of the nut is oriented in the vertical plane.


564. U.S. Forest Service, North Central Forest Experiment Station. 1966. BLACK WALNUT CULTURE. (Papers presented at the Walnut Workshop, Carbondale, Illinois, August, 1966, conducted by the U.S. Forest Service in cooperation with the American Walnut Manufacturers' Association and the Forestry Department, School of Agriculture, Southern Illinois University.), no series, 94 pp., illus. Includes 23 papers prepared by researchers and industrialists from many parts of the United States. Some of the subjects discussed were the present inventory and growth of black walnut, techniques in its growth and culture, improvement of the timber quality, quality requirements for veneer and sawlogs, uses of low-grade material, and insect and disease pests.

Inner septum, exocarp, and mesocarp develop first. The endocarp then forms and hardens, after which the seeds grow and develop rapidly. In contrast to other parts of the walnut fruit, (1) seeds continue to accumulate protein until ripe and (2) the exocarp, mesocarp, and septum contain high water and ash content until the end of ripening.

Inoculation with Staphylococcus has been conducted by the U.S. Forest Service in cooperation with the American Walnut Manufacturers' Association and the Forestry Department, School of Agriculture, Southern Illinois University.), no series, 94 pp., illus. Includes 23 papers prepared by researchers and industrialists from many parts of the United States. Some of the subjects discussed were the present inventory and growth of black walnut, techniques in its growth and culture, improvement of the timber quality, quality requirements for veneer and sawlogs, uses of low-grade material, and insect and disease pests.

Manganese deficiency in Juglans regia does not seem to affect foliage concentration of other minor elements. Mn deficiency can be corrected by spraying the tree during early summer or by injecting dry manganese sulfate into holes in the trunk or limbs. As contrasted to citrus foliage, walnut leaves have a somewhat lower barium content and a somewhat higher molybdenum and nickel content.

Illustrates three forms of leaf, and discusses other literature on the subject.


Contrary to previous findings, the author found that juglone had only a weakly antibiotic effect on Schizomycetes and none on yeasts or mycelial fungi.


A survey of the distribution, site requirements, age, condition, and regeneration of J. regia in this area of Bulgaria.


Covers fungus diseases including root rots and heart rots, bacterial diseases, virus diseases, mistletoe, nutrient deficiency symptoms, and climatic injury.


A planting trial in southern Hannover with English walnut grown from local seed. 1 + 2-year-old transplants were 1 1/2 to 4 feet tall but, when field planted under a light beech overstory or mixed with beech reproduction, about 90 percent were heavily damaged by roe deer.


Twenty-two-year-old (7- to 8-inch d.b.h.) grafted trees of the 'Lamb' walnut exhibit figured wood. The figure is more pronounced in the upper part of the bole than near the center.


Absence of endocarp is apparently a dominant trait.


341-344.

All nine varieties investigated showed satisfactory sifting when isolated, with no evidence of adverse effects caused by dichogamy.


Detailed descriptions are given of nine varieties.


Some J. regia x J. nigra trees showed hybrid vigor; most had intermediate foliage and branchlet pubescence. None of the 17-year-old trees produced many nuts.


Juglans cinerea seedlings used as stock for J. nigra scions are usually incompatible to the extent that the stock does not grow as fast as the scion and eventually dwarfs it.


Crushed unripe Juglans nigra hulls, when extracted with ether, yield an extract that spatters or at least depresses the movements of Daphnia magna, leopard frogs, perch, catfish, goldfish, mice, rats, and rabbits.


A brief version of the following paper.

584. White, Orland E. 1928. MUTATION, ADAPTATION TO TEMPERATURE DIFFERENCES, AND GEOGRAPHICAL DISTRIBUTION IN PLANTS. Verhand.5 Int. Kongr. Vererbungswiss. 2:1575-1586.

Using Juglans nigra as an example, the author points out that seed of southern origin may be much more winter hardy than its proven-
butyric acid before field planting failed to of J. regia but also includes considerable increase field survival or height growth, regeneration, development of mixed stands, Sci. Proc. 4:81-90. der Schweiz auf dem Ausste


Wiesehuegel, E. G., Zarger, T. G., and Hatmaker, J. F. 1957. HANDLING VALUABLE NURSERY STOCK. S. Conf. Forest Tree Impro. Proc. 4;81-90. Juglans nigra seedlings suitable for use as budding understocks can be produced in one growing season by using seed with minimum kernel weight of 3 grams, seeding to achieve nursery spacing of 12 x 42 inches, and supplementary irrigation.


Williams, Robert D. 1965. PLANT LARGE BLACK WALNUT SEEDLINGS FOR BEST SURVIVAL AND GROWTH. U.S. Forest Serv. Cent. States Forest Exp. Sta., Sta. Note CS-38, 5 pp., illus. One-year-old Juglans nigra seedlings may have at least 5/32 inch caliper (measured 1 inch above the root collar) for adequate survival in field plantings. Caliper should exceed 7/32 inch for satisfactory growth.


587. Wiesehuegel, E. G., Zarger, T. G., and Hatmaker, J. F. 1957. HANDLING VALUABLE NURSERY STOCK. S. Conf. Forest Tree Impro. Proc. 4;81-90. Juglans nigra seedlings suitable for use as budding understocks can be produced in one growing season by using seed with minimum kernel weight of 3 grams, seeding to achieve nursery spacing of 12 x 42 inches, and supplementary irrigation.


590. Williams, Robert D. 1965. PLANT LARGE BLACK WALNUT SEEDLINGS FOR BEST SURVIVAL AND GROWTH. U.S. Forest Serv. Cent. States Forest Exp. Sta., Sta. Note CS-38, 5 pp., illus. One-year-old Juglans nigra seedlings may have at least 5/32 inch caliper (measured 1 inch above the root collar) for adequate survival in field plantings. Caliper should exceed 7/32 inch for satisfactory growth.

591. Wilson, E. E. 1947. THE BRANCH WILT OF PERSIAN WALNUT TREES AND ITS CAUSE. Hilgardia 17(12):413-430, illus. Older trees of J. regia, especially if otherwise unthrifty, are most susceptible to the disease. J. hindsii and J. californica are notably less affected. The causal fungus is thought to be in the genus Exosporina.


596. Winkler, Otto. 1936. Der Nussbaum als Waldbau in einigen nordalpinen Föhntälern der Ostschweiz. /THE WALNUT AS A FOREST TREE IN SOME NORTH ALPINE WARM VALLEYS OF EASTERN SWITZERLAND.// Z. Schweiz. Forstver. Betg. 16, 90 pp., illus. Deals primarily with soil-site relations of J. regia but also includes considerable data on local growth and yield, natural regeneration, development of mixed stands, differentiation of local races, and importance of the walnut industry in Switzerland.

tings has been somewhat successful, most so with the 'Royal' hybrid (J. nigra x californica).

Describes propagation of several Juglans species from seed, by grafting, rooting of greenwood cuttings, and layering of seedlings in the nursery at East Malling.

Remarkably high concentrations of vitamin C are found in the endocarp of English walnut. The vitamin C probably originates in some other form in the leaves.

The fruit in earliest stages may contain practically no true vitamin C but very high concentrations of apparent vitamin C. As maturation proceeds the proportion of true vitamin C increases until in the nearly ripe nuts it approaches 100 percent.

Flower and leaf characteristics distinguishing Juglans mandshurica from J. steno-carpa and J. cathayensis.

All Juglans regia varieties tested were both self-fertile and inter-fertile provided pollen was available when stigmas were receptive. Blooming date, length of blooming period, and blooming habit as regards dichogamy all vary considerably in response to seasonal weather variation. Young J. regia trees are much more subject to dichogamy than old trees. Walnut pollen viability ranged from 9 to 80 percent and averaged 23 percent. Parthenogenesis sometimes occurs in the walnut.

Meiotic behavior of several species and hybrids and possible phylogenetic connections between Juglandaceae and Betulaceae. All walnuts studied have a haploid chromosome number of 16.

The character of walnut shell flour is influenced by three distinct zones found in the shell. Cellulose content diminishes from the inner to the outer zone, which is relatively hard and highly lignified.

Walnut shell flour tends to be granular rather than fibrous. For many uses, walnut shell flour is suitable for blending with wood flour.

Both racial and individual tree variation in growth rate were apparent in 3-year-old plantations containing 28 families (individual tree progenies).

J. mandshurica crossed readily with J. regia and J. sieboldiana, some combinations proving 64 to 67 percent successful. J. cinerea x J. mandshurica crosses yielded an average of 28 percent hybrid fruit. J. mandshurica x J. sieboldiana crosses produced two sorts of hybrids, one with a growing period of 138 days and seedling growth 2 to 3 times as great as that of seedlings of the parent species, and the second that grew for 148 days to be 5 to 8 times as large as seedlings of the parent species.

The hybrid J. mandshurica x J. sieboldiana is markedly winter hardy.

Includes walnuts.

610. Yamazaki, T., and Takeoka, M. 1957. ELECTRONMICROSCOPE INVESTIGATIONS ON THE SURFACE STRUCTURE OF THE POLLEN MEMBRANE.


Several mulches stimulated height growth of black walnut trees in the second year after transplanting; broomedge and well-rotted pine sawdust were most effective.

The varieties, selected primarily for nut quality, differed widely in grafting and budding 'take,' and in planting survival.

Trees mulched with broomedge or straw to a depth of 3 to 4 inches grew twice as much in height and diameter in a 5-year period as those receiving no mulch.

Emphasizes budding, grafting, and handling of clonal material. Also covers seed collection and seedling production.


Brief notes on work at the Kirgizskaia Lesopodnoia Stanciia towards the development of forms or hybrids of Juglans regia that might escape damage from late frosts.

Based on the author's studies, extending over nearly 20 years, with chapters on: regeneration by coppice; root systems of trees of seedling and coppice origin; regeneration fellings; selection of coppice shoots to grow on to tree size; planting and sowing; grafting; selection and breeding; nursery practice; seed collection, storage, and treatment; pests and diseases; and utilization. Refers chiefly to walnut (Juglans regia). An appendix suggests details of plantation establishment and organization for various local conditions.

Describes a Juglans regia layering technique in which rooted shoots are taken from stool beds in spring, stools are then mounted over with about 10 inches of earth and allowed to grow new shoots. When these shoots develop to about a half-woody stage, they are split longitudinally, again mounted over, and develop almost twice as many rooted layers as would otherwise be the case.

Production of own-rooted walnuts in the nursery.

624. Zhuravskaya, E. Y. 1958. /A WALNUT HYBRID IN DUBLYANY VILLAGE./ Les. Khoz. 11(9): 75-76. /In Russian/
A cold-resistant Juglans regia x J. nigra hybrid.
CULTURE OF JUGLANS

Comparison of Walnut Rootstocks


The author recommends further trials of walnuts in mixture with several other species.

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Exotic species (see Silviculture)

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Nutrient deficiency (see also Kultur): 59, 103, 121, 224

Further trials of walnuts were recommended in mixture with several other species.
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