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Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

Among the plantings at Nanking are some with white flowers, either with or without purple spot. White flowers seem to run much smaller than yellow, and do not open as widely or close earlier in the day. One variety or selection with albino flowers has only small plants with leaves much more distorted by leaf-hoppers than the other Chinese cottons. Flowers of yellow flowered plants widely open at midday, exposing staminal column and purple center. Usual position of flowers nearly horizontal. On short branches near top of plants flowers may ~~xxx~~ stand completely erect and some on lateral branches droop, especially on the longer branches near the ground. Most of the plants do not have veg. branches and most of them are less than a foot wide, even when standing 2-3 ft. apart. Hence much closer planting would be indicated for practical purposes.

Crossing might be done with such flowers

Rows 26-32 in. apart, plants 10-12 in. and not crowded. Plants 1-3 ft. high, all affected by leaf-hopper; distortion and dwarfing of new growth, but variable amount often very bad, with most of the leaves abnormal. A few plants with very narrow leaf-lobes perhaps the true chicken-foot. Rank growing tall plants more affected by leaf-curlers. Many of these also very abnormal in branching. Some put out short axillary branches on main stalk and even bolls in axillary positions, with pedicels of usual length and no bracts or stipules to indicate presence of shortened branch. Extreme distortions and mutilations of leaves much like tomosis on these abnormally branched plants often accompanied by loss of terminal buds of main stalk or branches. New shoots being forced out on main stalks low down with all leaves badly distorted and often shredded like leaf-cut, no doubt of same nature in occurring very early but cause must be different.

Mites of two kinds found in chambers of lower side of crumpled leaves, one becoming rather large greenish or reddish with dark points on abdomen. Other smaller, flatter, rather narrowly turtle-shape, uniformly pale reddish. But these mites only occasional, other insect a (leaf-hopper?) larva flatter and larger than that of leaf-hopper on University cotton, which is also abundant here.

Further canvass of smaller plants shows that tendency to become very abnormal and show great distortion and laceration of leaves is a general one, so that the abnormalities noted above may prove merely to be extreme cases or forms of the leaf-hopper disease. Individual plants often show notable and

consistent differences in amount of distortion and especially of laceration of leaves, some with no laceration or only a little on a few leaves, others with much laceration on many leaves. Also it is plainly a late-season or mid-season development, plants now producing much distorted lacerated leaves having produced entirely normal leaves earlier in season. But disorder seems to have been in progress for several weeks and undoubtedly is interfering seriously with the development of the plants. Whatever its cause or nature, undoubtedly must be considered as a factor in crop production. May not be very serious under some conditions, but extent to which growth is altered indicates a constitutional state, different from tomosis and also from hybosis? of plant lice. Plants might not recover even if insects were removed. Badly affected plants with branching abnormal and the leaves much distorted and lacerated are often entirely sterile or may have a boll or two near the ground, but with no flowers or buds developing above.

Flowers of 3 kinds noted in this field, white, yellow, and yellow with purple spots. Yellow flowers, even without spots are larger than the white flowers.

Field had been allowed to grow up to weeds badly, and cleaned out not long ago. Is this customary, or clean culture? Perhaps started with other crop, but no beds or other indication.

Chicken-foot? plants have yellow flowers, with or without spots.

Worst cases of disease become dense masses of distorted foliage effects, like coca disease, though not as dense, but suggests it.

Bolls light blue-gray.

Hardly to be supposed that insects behave differently on the individual plants, unless to attack them less. This to be noted in reference to different degrees of severity of distortion and lacertaion of leaves.

Purple stemmed chicken foot considered more susceptible to chicken foot than a green stemmed type. Green stem has lighter foliage, fls without spots but yellow. Also discolors with disease but leaves not so strongly distorted. Mr. Wu considers leaf-hopper disease has appeared

"chicken-foot" 鸡脚病

"Green stem" 青茎

very late this year. For last four years plants of chicken foot have grown only 1'-1 1/2 ft. high instead of 3-4 feet as this year. The late coming of the disease ascribed to cold & wet weather this spring. Consider if spring weather is hot disease will appear early.

Topped at about 1 ft. has developed numerous veg. branches as well as greatly extending the fruiting branches of the main stalk. The early bolls were mostly aborted, but may be replaced by short branches from the axils of the leaves of the fruiting branches, or vegetative branches with several joints and a short 1-boll fruiting branch at each joint may develop from an early fruiting branch.

Chinese cotton densely leafy suffering very little from leaf-follers which are riddling the Upland cotton close by. Also leaf-hopper discoloration and distortion also much greater on the Upland cotton. Some plants have remained small but dense foliage much distorted. Squares forming but no formed bolls yet. A few bolls open on the Chinese cotton, the first seen Aug. 19.

Effect of cutting back Upland with too few fruiting branches certainly is to defer crop and decrease chances of full "set". Advantage of the early branches clearly shown on plants where some were left. Present work of leaf-rollers on plants that were able to set crop early not serious. Most fertile plant noticed total 13 bolls on most productive plant noticed. Large end plant 14 bolls with poor stand.

Plants that have not grown much and are badly affected with leaf hopper curl seem to be spared by the leaf rollers, but these very capricious. Effect of early pruning to secure greater elongation of early fruiting branches shown on many plants

but often no bolls were set on the long branches, so still no definite indication that advantage is to be gained in this way. In second planting visited rows are 34-36 in. apart and plants 15-18-20 inches. With even stand yield would be fair, 15, 1, 10, 7, 9, 16, 6, 8, 0, 8, 10, 14, 0, 3, 14, 7, 1, 6, 16, 26, 4, 13, 8, 6, 9.

Danger of mildew under heavy foliage indicated.

Or it might be found practicable to carry the selection work into parts of the country where the disease did not exist or appeared only late in the season. There would be need, however, to take the existance of the disease into account in breeding work, since it might be very important to secure strains that were affected as little as possible by the attacks of the insects.

Has developed a very good crop of bolls at Nanking and some have opened by Oct. 21st. Frost said to be possible in about one week. Foliage shows leaf-hopper distortation and discoloration, but plants have continued to bear well at the top, showing less susceptibility than Upland.

Flowering and fruiting abundantly September 10th. Many late bolls developing though. Plants are badly affected with leaf-hopper disease. Shows this is less serious in effect. Other varieties flowering but less abundantly and bearing less now - little or none.

At Wusih more susceptible to vein-blight, also on squares. But with many bolls set and full grown but large numbers of plants with no bolls at all, these running badly affected with leaf hopper disease.

Striking difference of behavior between this and Egyptian. Much shorter, more compact and leafy, also foliage much lighter and more yellowish in color. Sea Island rows probably have advantage from proximity of Egyptian which have little foliage to shade. Searcely any leaf blight and very little spot on Sea Island. Also much fewer insects (leaf rollers, but may be on account of late development.

At Nanking at middle of August in distinctly better condition than Upland varieties and flowering more abundantly, owing to relative immunity to vein-blight and insect attack, perhaps resulting from later development, but this not certain. Plants very short-jointed in comparison with Egyptian.

Leaf-hoppers at Nanking not working on tall rank-growing cotton in lower and more moist part of field, but affecting all varieties at the dry end, especially the Upland series. Sea Island shows least effect, ends of leaf-lobes yellowish and somewhat crumpled and up-turned. Egyptian more strongly so. On Uplands the tips and margins often are strongly affected showing dull yellowish or reddish discoloration and turned down or up, or irregularly contracted and crumpled over the entire surface in severe cases. The centers of such leaves remain dark, sometimes darker than the normal leaves, with the veins pale or reddened, showing more contrast than usual on healthy leaves. The yellowish discoloration advances from the margins somewhat gradually blending with the darker color, but sometimes shows definite contrasts when a large cross-vein is encountered. Or the progress may be uneven on two sides of any of the principal veins, which gives a somewhat mottled effect to the foliage of seriously affected plants.

Possibility of developing Upland variety immune to leaf-cut injury indicated by comparisons noted on previous page regarding Columbia and also by apparently much greater resistance of native cottons, some of which show scarcely a sign of injury by the side of Upland plants that are badly affected. But some of the Asiatic plantsare distinctly injured with the leaf lobes and margins strongly up-curled or other-wise distorted and the color a very pale yellowish green, in extreme cases even lighter than usual in Uplands, without the brownish or reddish tinge that often appears in Uplands.

Cotton (India) Wuchang Experiment Station, China. 9-30-19 pp 194-195

Growing at Wuchang Experiment Station and not showing leaf-hopper injury. A slender, hairy, narrow leafed sort with white and also with yellow flowers. Some plants affected but these look like Chinese and likely to be hybrids. (Grown here 4 years) Very hairy plant in chicken foot not distorted; probably hybrid with India.

Apparent immunity of Hairy Indian type to leaf-hopper injury a notable feature. Three kinds or different lots of Indian seed said to be represented at Wuchang Station, but all closely similar in habit of growth. Taller and more slender than the Chinese type. The hairy stems and leaves are in notable contrast to those of the Chinese cotton. Leaf-hoppers were not found on the Indian cotton. No thorough search was made, but they were very abundant on the Chinese and Upland. Nature of immunity only to be conjectured whether plants are distasteful to insects or are not injured from being bitten.

Roller gin of Chinese manufacture costs about $40.00. Worked by one man by foot-power. Gins about 50 catties of lint a day. Paid one copper per catty, without board. Machine does excellent work. Roller gin principle, same as ours, but roller.

Excellent fiber at Wuchang Experiment Station but not prolific and late in opening compared with (native?) Upland varieties planted near . Greater susceptibility to leaf-hopper disease shown in failure to grow only very short stunted shoots above large normal leaves. Most of the cottons have been able to grow more, and even to produce a few bolls on the reduced and distorted part but Durango plants usually have only 4 to 6 inches of very small distorted growth. (See photo).

Cotton (Chinese) Wuchang Experiment Sta., China 9-30-19 p 193-194

At Wuchang planted 5 to 6 inches in rows and rows one foot apart. Many plants have only 2 to 3 bolls, the larger 5 or 6. Many plants less than 1 foot high, the largest 2 feet at end of season. Upland close by 2-1/2 to 3-1/2 feet. Average of Upland 2 feet and over. Chinese 1 foot or less. Yield of Chinese and Upland (1 ft x 3 ft) about same 180 cattiew per mo (seed cotton) in favorable seasons but Upland more reliable on account of leaf-hopper disease, which is considered more severe on Chinese at Wuchang as at Nanking. Here at Wuchang, a difference very evident is that Upland (Trice) produces bolls on nearly every plant on the short jointed leaf-hopper growth whereas Chinese cotton has the leaf-hopper growth entirely barren. Leaf-hopper infection of Chinese cotton begins suddenly at end of June or beginning of July. Infestation very rapid, in single week. Attack on Upland said to begin first of August by migration from the Chinese cotton. (so stated). But may be ascribed to greater vigor of Upland, showing arrest of development later.

Leaf-hopper disease becomes distinctly apparent at Changteho and Changchow, causing extensive destruction and tomosis effects in native Chinese fields and also in Upland series, at Changchow. In King several plants were entirely sterile, also in Sea Island leaves of some plants notably sterile. King and Sea Island plants extensively cut, leaving open lace-work more extensive and more general over leaf than in genuine tomosis, the tissue dying out at later stage of the development of the leaf, resulting in numerous limited lesions instead of the extensive cuts along the fold lines as in genuine tomosis.

In fields around Changte Ho cultivated in large quantities. Country visible in all directions from tomb of Yuan Shi Kai almost a continuous cotton field. By far the most extensive crop, grown in alternation with wheat.

Not being grown at Wushi. Many beds very badly affected, many plants with no bolls and few with more than 2 or 3, on lower branches, none on upper and all upper growth distorted. Evident that very much depends on date of planting or rapid development in spring, to the point of putting on fruiting branches early.

Cotton (China) Anking, China. 10-20-19 pp 222-223

At Anking plants small in both plantings, seed having arrived late, and leaf-hopper injuries began probably at early stage of growth. All the provincial experiment station cotton, Chinese and Upland, very badly affected with hopper injury. Hoppers apparently same caught on soy beans. Previously on egg plants near Shanghai. Get material identified. No indication at Anking of late growth with less hopper injury as at Nanchang. Confirms suggestion of ~~Wedy~~ shading conditions restricting manifestation of this disorder. Could be tested by changing conditions, by partial shade and watering, as by putting wire cage over plants, not to exclude hoppers but to modify atmosphere and light conditions. Probably not of practical bearing directly, but failure to recognize influence of conditions might greatly complicate experiments. Relation to tomosis a feature of importance in understanding behavior. Renders plants susceptible to climatic effects that otherwise would not be shown. Would be one way of ~~x~~expressing, if it appeared that exposure to light, heat or dryness were necessary to get the distortion and discoloration. Just as with tomosis external conditions bring out the latent weakness of the oil glands in relation to unfavorable environment for the seedlings.

At Nanchung in Kiangsi Province cotton plants small, the plot entirely surrounded by trees. Small area in middle of plot showed larger plants. Shade and competition with trees no doubt restricting factors. Crop ripened in September. Few late bolls. Leaf-hopper disease general but not extreme and some plants apparently less affected late in season, reminding that at Nanking the disease did not affect plants in shady end of field so much as in the dry open places. Photos taken of Durango and Lone Star leaves, also plants of Durango, Lone Star, Egyptian and Trice, showing leaf-hopper effects. Sea Island and Egyptian leaves redden on the margin with age, though less than Upland. The lack of red reaction to the leaf-miner in Asiatic type a genuine feature? Also generally less reaction with Indian type apparently immune. But some of the new recently developed leaves of Upland variety at Nanchang appears nearly normal as though heat were necessary to develop the distorted condition. Different reactions of individual plants also noted at Nanchang, some plants with leaves much less curled and discolored than their neighbors, some with leaves all small, others with leaves not much reduced, even when margins are discolored.

About 15 miles south of Shuntehfu, a district almost solid cotton apparently, extended well back and for some miles along the railroad. Apparently fine stand of Asiatic type. No Upland detected.

Nanhsuchow many bolls mildewed and ~~mixed~~ ruined under all varieties, including King and Trice. Growth very rank. Leaf bullate and leaf-hopper distortion extreme. Chinese said to be very careful to avoid planting on too rich land. Bolls large and fiber good, but crop likely to be lost by mildew and frost.

Reaction to leaf-hopper of same general nature as with Durango but the discoloration with less tendency to become reddish. Plants generally 6 in. to 1 ft. shorter than Durango but sometimes equal or taller occasionally. Many plants are not bearing but some have several large bolls.

Photos taken at Nanking Oct. 25th of specimens secured yesterday, showing different stages of leaf-hopper disorder, all extreme, but some plants more than others. Some plants have squares and small bolls on the abnormal branches, others not. Some have joints of stalks much shortened so abnormal branches form dense mass, while others are somewhat open. Contrast between normal leaves and distorted small leaves, also shown. See notes in photo book.

Leaf-hopper disease probably not shown on leaves already formed or only as *discoloration*, but probably not even this as old leaves remain apparently green and normal on plants with large amount of abnormal leaf-hopper growth. Photos at Lakeside to show contrast of small leaf growth with several sizes of leaves on stalks held in hand.

Cotton in partially shady place in very moist soil at foot of slope

Shows that nutrition physiology of plant is not affected but only growth physiology parts injured during growing. Tissues susceptible of injury only during process of growth

Short joints and dense leafage, deep red and dying on way to Wuchang Experiment Station. Distortion effects strong but no tomosis in this place. Perhaps results of damp climate.

Late leaves of Chinese cotton at Peking badly affected with tomosis, but not crumpled or discolored. Question whether this form may not be due to hoppers. Only large species seen.

susceptibility to tomosis as ~~result~~ ~~of~~ sequel of leaf-curl?

Very serious at Wusih including Sea Island. On many plants going over to tomosis condition as in Chinese cotton at Nanking.

means oil glands weak element of tissues break down first under severe strain

Perhaps more serious with Asiatic type in preventing upward growth of stalk needed to produce good crop. Stunting of plants results from shortening of internodes of main stalks and branches. Lone Star and Durango plants taken August 27 showing definite contrast of normal and abnormal foliage and habits of growth. Shortening of petioles goes with reduction of blade Petioles of last Durango plant only half the length of the others, on the affected part.

Abnormal branching as symptom of this disease shown on some badly affected Durango plants not of large size that are producing small vegetative branches from axillary buds of upper part of the main stalk in addition to badly affected fruiting branches from the same nodes. Squares are now being held to blossoming stage and beyond on branches that have the leaves badly distorted, and young bolls are developing on such branches even when the nearest leaf is distinctly discolored and distorted in some cases to about half size, so that the disease can not be considered simply and directly as a cause of abortion. Some of the very small, badly affected plants are now producing flowers, but the young bolls are aborting after the flower falls. Abnormal branching on fruiting branches another feature on small rather stunted plants that normally would have only simple fruiting branches. Probably somewhat cooler weather recently is allowing more of the buds to develop to the flowering stage but it remains to be seen whether normal bolls can be developed on distinctly discolored and distorted portions of the plants. Plants badly affected above often have normal well grown bolls below produced on early branches that may have begun to grow before the plants were affected. The early leaves continue to appear normal on plants that are very badly affected above, but on some plants there is a yellowing of marginal areas that may represent an extension of the disease in leaves that do not become distorted, the tissues being matured.

Said to be much worse in some years, and to have kept the chicken foot from producing anything.

Leaf-tissues beginning to die out between veins in large patches leaving only about 1/4 inch or less above along veins. Photo shows rather small plant with abnormal branching from all joints of main stalk etc, leaves drying out between veins. This is to be considered as advanced stage of disease. If general would mean serious set back at this period. Would not interfere and might even accelerate opening of early bolls, but would mean no more growth from about Sept. 1 so that long fall could not be used. Proper handling of Upland as short season crop may be the way out.

On August 27 the new growth and upper leaves of Sea Island are showing the leaf-hopper disorder very distinctly. Plants at shaded end of row have the leaves somewhat distorted but not discolored, though leaf-hoppers are abundant. Also on Upland varieties the leaves remain greener on shaded end of row, but the disease has advanced along the rows in that direction, so that most of the plants now show it distinctly. The plants are well shaded against the morning sun but are fully exposed in the afternoon. Weather has been dry, that is ~~the~~ no rain for last two weeks.

The wide distribution of the disorder and the fact that it usually is not considered abnormal, would argue strongly against a recent introduction. It may have been present during the entire period of cultivation in Central China of the annual type of cotton, which, according to Chinese scholars, was introduced from India about a thousand years ago.

Leaf-hopper disease called "wilt" in China. Would be considered "mosaic" disease. In partially shaded King cotton, more striking in color differences, not reddish as in dry exposed cotton near university, but light yellowish green on margins often contrasting sharply with the darker green of the unaffected central areas. Runs first around margins then into webs Keeping rather away from veins.

In the Nanking University experiments the Columbia cotton appeared to be less injured by leaf-club than other Upland varieties, Trice, King, Durango, Acala and Lone Star, but the reason may be that Columbia was later than the others. Trice has an advantage on account of earliness, but Acala and Lone Star appear promising in some of the drier districts. At Wuchang the Trice cotton continued to produce bolls on the club-leaf growth, which in the neighboring Chinese cotton was entirely barren.

Leaf-hopper infection extreme at Wuchang. Insects very abundant, all new growth badly affected. Leaves generally reddened and dying between veins, but no tomosis effects in extensive plantings at Experiment Station.

In Chinese cotton individual differences of reaction to leaf-hopper very apparent in other ways than tomosis. Some plants less seriously affected. Leaves reduced and ~~parts~~ joints shortened but not very abruptly different. Others have leaves very small and joints very short, but not very much discolored or distorted. Others very distorted and pale colored but each larger(?) size than the preceeding.

Leaves of Durango cotton photographed yesterday as large leaves separate (Nanchang) are seen not to be red on under side but pale green under the red areas, in most places. In some cases with older leaves the under surface also is becoming red but only to a slight extent compared with the upper surface. Places now red on under side are outlined with ink on two such leaves, to see if red color increases with drying. Other parts described above as pale show scattered red points or small spots, each centered on an oil gland. Other specimen branch of Durango from Nanchang had red only on one mutilated leaf, the young green foliage being only pale on margins. Note on dry specimens to see if colors change in drying. Probably normal uninjured leaves color first around the oil-glands as on red spider leaves, but this also indicates oil glands ~~are~~ as weak tissue.

Native fields in dry, hilly district beyond the Ming tombs (foot hills of Purple Mountain). Chinese and Upland in adjacent fields. Leaf-hopper very serious in Chinese, transforming plants into dense masses of small leaves, and almost completely unproductive. Many plants of the Chinese seem to have ripened no bolls and only a few have even a boll or two on the late growth. Upland field has fair crop for size of plants, which are rather small, though spaced widely about 3 feet apart.

East of Nanking near Ming Tombs farm of Mr. Wu, plants hung on rope to dry and open. ~~This is~~ There (?) a small variety mixed with Lone Star. Crop picked has been 25 piculs for 40 ~~months~~. Cotton picked promptly to avoid thieves and left out 2 to 3 nights in dew to improve quality and bleach fiber which might lessen appearance of stain. Lone Star 7 mo. 50 catties equals 185 lbs ginned cotton per acre, but thieves take part of crop. Plant lice on Chinese and Upland Oct. 22nd.

Leaf-hopper disease of China. See notes on Chinese cotton at Nanking Aug. 15, 1919. Perhaps publish separate short article about A leaf-hopper Cotton Disease in China, noting similarity to plant louse disease of cotton hybosis and to tomosis. Cyrtosis might serve as name, leaves arched up rather than thrown into humps as by plant-lice. But plants apparently become immune or recover from plant lice, which they apparently do not with leaf-hopper disease. Refer to East African cotton disease. See if same. Also leaf-hopper diseases of sugar beets, sugar cane, etc.

Photos No. 1. Leaves from same plant badly affected with tomosis- like form of disease, badly lacerated with little discoloration, especially on badly lacerated small leaves but margins of large leaf at base are yellow and others on same plant.

Photo No. 2. Another plant with little laceration and more yellow. Basal leaf normal except on lower side of one side lobe. Leaf above not lacerated or punctured but more than half yellow and margins distorted. Other leaves cut, representing worst cases on this plant.

Photo No. 3 Same plant, two other distorted leaves as example of usual effects of disease, More gentle crumpling than laceration or serious distortion, though one leaf has middle lobe crumpled under.

Photo No. 4 Young branch of another plant with much abnormal growth and leaves of new growth much distorted and lacerated.

Photos Nos. 5 & 6. Abnormal small branch with much distorted and lacerated leaves.

Photos Nos. 7 and 8. Leaves and small branch from plant with narrow lobes, chicken-foot?.

Photos 9-12. Specimens from different plants showing different forms. No. 12 badly affected new growth.

Seems especially unproductive at Nanking. Has held very few bolls, apparently less than Lone Star. Even small plants in the drier land have mostly shed everything. Columbia foliage seems distinctly less affected than Durango by leaf-hopper distor tion and discoloration, also less than Lone Star. This difference ? very evident in both series at Nanking though some Columbia plants show the leaf-hopper injury plainly enough ~~nicher~~ neither the discoloration nor the distortion is as great and more of the plants show only a slight scarcely appreciable injury. Discoloration paler and more yellowish on Columbia, having little of the brownish tinge developed on Durango and Lone Star. Color differences more striking with amber glasses, but appreciable with naked eye. Hence might be considered possible to develop variety resistant or immune to injury by the leaf-hoppers.

Leaf-hopper injury is a disease in the sense that the plant is rendered abnormal in its growth and no doubt in other ways, including the usual failure to develop fruit on the affected parts. The effect of the leaf-hopper is as it were to poison the plant so that its growth and other behavior become abnormal. Analogous to so-called Mosaic diseases and similar disturbances of other plants which are ascribed either to chemical, physiological or enzymetic causes or to ultra microscopic organisms.

Title contrast with ~~to~~ Plant-louse leaf-curl.
Other Non-Parasitic diseases

Include ref. to fact that ~~the~~ base of leaf is chiefly affected in plant-louse case
not tips in leaf-club disorder

disturbance?

Cotton (Disease) Wuhu, China. 10-21-19 pp223-224

Red-leafed variety of Chinese at Nanking has suffered less than other varieties. Has grown twice as large or more. Leaves turned deep red on tips and margins, but not much distorted. Poor stand in parts of experiment field at Nanking ascribed by workmen or assistants to small pink(?)worm (cut-worm?) Said to use lime for this at Provincial Agricultural School.

Also immune Indian var

As stated in preceding notes, Sea Island and Egyptian are undoubtedly less susceptible to leaf-hopper injury than the Upland stocks.

Leaf hopper disease general at Nantungchow both on Chinese and Upland cottons but only a few leaves on recent growth affected. Hence can not be considered as a serious factor in this section of country, in such a season as the present.

Not productive at Nantungchow. Less so than Lone Star. Question of any large boll variety being able to open.

Suggests possibility or desirability of determining further extension of cotton to the northward in dry regions of southwest. Small plots like Chinese or perhaps Acala selections for high districts to be undertaken, also in North Carolina, Tennessee, Texas, New Mexico, Chico?

At Chuchow only variety except King and Trice to have open bolls. None on Durango, Columbia or Lone Star. Much greater length and abundance of lint make very important to get slightly earlier strain if possible. Desirable to try at Lanham, on ridges, to get prompt germination and early growth.

Acala type still distinctly variable and advantage should be taken with this and also with Tuxtla to separate desirable short staple strains early in maturity with abundant uniform fiber. If at home in spring make planting of this and Durango with treated and untreated seed with flat and ridge planting at Lanham to test earliness and compare behavior and learn advantage to be secured by breeding from sore shin fungus in early stages, if this can be secured. Surface soil could be sterilized by burning to test effect of this perhaps would through light on presence of fungus in seed or in soil.

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Boll characters quite varied, in size, shape, color and texture of surface with close or scattered glands, smooth or deeply pitted with the glands showing distinctly against a very pale green or whitish skin and less conspicuous with a darker green skin. . Shape of bolls varies from rather narrow conic and tapering to short and square with abruptly apiculate apex, either long or short, acute or blunt. General conclusion, no lack of plant characters to use as base of selection, with some prospect of establishing useful correlations. The divisions of the boll may be deeply grooved and the groove shallow and sloping or narrow and abruptly cleft, but may not run to the tip. Form and position of this depression or cleft may be of more use than in Upland type. Very great diversity in lint characters in cotton from native fields around Paoting fu, from very short and rough to rather long and silky. Some very smooth and soft. Samples of long silky from native field at Paotingfu Sept. 22.

From behavior in region about Shanghai and Nantungchow may be considered as better adapted than Upland to humid climate of the coast belt. May have relation to coast belt.of U.S., in case cultivation were found practicable. But Garo Hill much superior for our purposes, on account of labor saving, resulting from larger bolls. Immunity of Asiatic type to leaf-spot vein-blight, anthracnose, etc. should be considered carefully.

Abandonment of native type of cotton would mean cutting of this source of supply for rough cottons . Two types of rough cotton, South American and Asiatic. South American large Sea-Island-like reported only from Peru, but extends widely.

Not early in the sense of producing large crop in short period on plants standing wide apart. Upland cotton has great advantage in this respect in the much larger size of the bolls. Native type at Nanking would need to grow rather tall which is prevented by leaf-hoppers. Also interferes with Upland cotton in latter part of season but crop can be set earlier if conditions are favorable in spring, to judge by present season, which may be exceptional.

General inspection of Reisner's plantings showed Chinese cottons suffering much less from insects than introduced cottons, Upland, Egyptian and Sea Island. Some forms appear similar to the Garo Hill type.

Estimated July 1, 1919, that crop will be one million bales smaller than last year. General belief in policy of reducing acreage indicated. Reduction especially among large farmers, while small have maintained or increased acreage, and some have begun to plant cotton for the first time. Obvious limitation of idea if effect is to be to increase and establish production in other parts of the world. Efforts in this direction have been made from England for nearly a century. Look up history of in Indies, etc. Refer to efforts in tropical Africa. Recently discovered that conditions in Natal, Transvaal and Rohdesia are very favorable , and large expansion is to be expected in that quarter. Large efforts also in Brazil and Argentina, also Peru, Venezuela, etc.

As possible indications of rapid change of Chinese Agric. mention change of policy among? missions to agric. and response of Chinese to this as shown by support of College at Canton and Nanking University, increase of student body, raising of tuition, etc. Not true that China is over-populated to the extent commonly supposed. Estimate that not more than half of the land is effectively occupied. Bandits ravage many regions and prevent separate families living on the land. This system said to exist only in Province of Szchuan. Present conditions may be supposed to represent transition stage merely. Building of roads, popular education, introduction of stable currency are reforms likely to be established within a few decades at the most, in view of those familiar with field. Need to verify such impressions as far as possible, with direct reference to agricultural progress, and whether cotton or other crops are likely to dominate in the enlarged production. Cutting out opium means not only more land, but more energy to be applied.

At Nanking University experiments show much more serious injury of Upland and other introduced cottons by insects. Extensive damage by leaf-roller, or other leaf-eating larva, especially in rank growing somewhat shaded position of field. Most general injury a deformation of leaves by leaf-hoppers. Not so much distortion as with plant-lice, but color more affected.

Indications of experiments at Nanking that Egyptian, Columbia and King at least may be definitely excluded, probably Sea Island , Durango and Lone Star, leaving Trice and Acala as two best sorts to be tested against each other. Probably both should be ~~given~~ grown in separate plots and selected at same time, while the 4-row tests are carried through period of 3-5 years, to ascertain differences adequately. Trice no doubt inferior in lint, but may yield more. But might be necessary to make careful account of values. Also would need to test against best Chinese sorts grown in a way to give full chance to yield.

Stated by A. B. Rosenfeld & Son in letter to Prof. Reisner Aug. 14, 1919, spindles in China in 1896 totalled 379,000, seven mills in Shanghai, and one each at Hankow, Soochow and Ningpo. Mills now in operation, Shanghai 806,666 spindles in 22 mills, "Interiors" 183,500 spindles in 9 mills, and 412,400 spindles in other parts of the country, 13 mills, Ningpo (2) Hankow (2) Honan (2) Hunan, Tientsin (2) Tsenanfoo, Soochow, Tungchu (2) making a total of 1,401,556 spindles in 1919. Additional spindles about 250,000 being placed in mills under construction, and about same number ordered for proposed mills. In the past they (Chinese Govt) did approach the U. S. Government to recommend them an expert to teadh the farmers how to cultivate cotton from American seed scientifically and by up-to-date methods. The U. S. Government readily responded to their request, but with the usual Chinese officialdom they kept the expert, Mr. Jobson, who was especially sent out by the American Government locked up in Peking for three years awaiting instructions from the Department of Agriculture to fulfill his agreement for which he was originally sent to China. In the interval they were ganerous enough to give him a small plot of land in the Zoological garden at Peking to "wile" his time away before undertaking the vast proposition before him. Prior to the expiration of his agreement, however, he tendered his resignation to the Chinese Government which in the usual official politness was accepted with regret." This may be taken at least as current belief in Shanghai regarding Mr. Jo bson.

Cotton (China)
(Production and consumption)

The 1,401,556 spindles supposed to use one catty per spindle, night and day work, with 25 working days per month, a total consumption by mills, -------- 4,200,000 piculs
Average export per annum ---------- 900,000 "
For wadding, blankets, etc., at
1/2 catty per capita ---------- 2,000,000 "

7,100,000 "

equals approximately 2,000,000 500-lb. bales. Present rate expected to treble in 10 years.

In letter of Mr. H. Y. Moh, Aug. 16, 1919, to Mr. Reisner announces that "our association has decided to take a policy in growing cotton where this valuable plant hasn't been grown before. A central station of about 1,000 mow in size, near Hsuchow, Kiangsu, will be established, and the head of which will be an American expert. Our association will also select 20-30 graduates of agricultural schools and put them under the control of the American expert. After one year or so such followers will be employed as chief of a substation directed by the same expert, and such sub-stations will be established wherever cotton can be economically grown in China."

Crop reports in season of 1919 showed heavy rains and cold weather in northeastern district, but good prospects in Hanhow, Shen si, Chili, etc. Also worm attacks noted as danger in the eastern districts. May be inferred that crop will be more precarious in the more humid districts, as in U.S.

General sprinkling of fields at Shanghai with very small-bolled Upland type said to be very late and bolls lost hence not liked by the farmers. No open bolls. Seed should be planted with American varieties to compare behavior May be indigenous Upland. No spotted flowers seen. Hence no indication of King type though somewhat resembling. Boll ? entirely smooth.

Chicken foot green stem at Nantungchow has yellow flower with no spot.

More equable climate of China in general may mean generally better quality of fiber.

9 taels in Shensi 32 in Shanghai dust enroute requires picking all over at Hankow to separate damage. Loss of about 10 %.

First shipment new cotton from Ningpo 570 bales came in Sept. 1, 1919.

Upland cotton at Garking reported by Mr. Li as not growing large, Sea Island and Egyptian not bearing, only Trice and Lone Star bearing a few bolls.

Raised by market gardeners about Shanghai. A few beds may be put in alternating with beans or other vegetables. Usual to have beans on one or both sides of beds, or replanted with beans. Also ~~some~~ rice in furrows or in replanting Chinese better adapted for wet districts. Try Garo Hill in coast country seriously. Came from Arsan? also wet country. A large part of the land in this district is handled in beds which may be considered as the general system in this part of China. Broad casting of cotton in the wheat is made possible by the narrow beds. Wheat and stubble Wheat cutt off about 1-2 in. above the cotton. No question of exposure or drying out of young seedlings. Single stalk system Good habit of Upland native type suggests feasibility of some such method in U.S. for Asiatic cotton.

Would seem that most effective measure in relation to Upland cotton in China would be to establish an adequate supply of pure seed, in some locality where it can be grown to advantage, as at Nanking. Important to know whether normal opening takes place on cotton at Ming Tombs. Large amount of unused high ground in this district where cotton properly handled might mature regularly. Perhaps Lone Star could be grown here if use of seed in other interior districts is to be contamplated.after seeing experiments. Use of Upland in coast districts very dobtful and not to be urged at present time. Also seed needs to be available in practical quantities, as no assurance of purity on account of general presence of Upland small-bolled type in native Chinese cotton.

Cotton (China) Hangchow, China. 9-5-19 pp 107-108-109

Upland cotton on reclaimed land north of Hangchow has not grown large and has heavy smooth leaves more like the cotton of arid southwestern districts in the United States, doubtless on account of salt in the soil, which is only recently reclaimed. Plants only 12 to 15 inches high often have 5 to 7 large bolls; a few 8 or 9. Would be very productive with good stand, but very scattering. Interplanted with Chinese cotton, but plants have not grown large, about the same size as in other adjacent land. The Upland cotton is more productive, plant for plant, than the Chinese cultivated in this district, but Chinese can grow with more plants on same surface, so case is not to be settled by comparing crop of individual plants. Not to be expected that salt will remain long in land if drainage can be made complete. Chief difficulty apparently is the drainage, to get the land dry enough for cotton to grow well. Suggested experiment with higher beds that would serve in a measure to test in advance the results that might be expected from improved drainage. Apparently all furrows fill with water in rainy periods and tops of beds are only 3 to 4 inches above water level. Plants always largest in middle of beds, showing slopes too low and wet. This may be considered as general condition in all the flatland cotton districts in the general region of Shanghai. Beans planted on slopes of bed very often, but cotton generally not good on slopes where beans are not planted.

Alternation of crops makes possible control of some insects or diseases that might be more serious otherwise. Though cotton may be raised every year, use of land for wheat or other winter crop means that cotton is eradicated. Even stalks generally used for fuel and land plowed or forked over for wheat or other winter crop. Grave mounds an opposing factor, tending to give shelter to insects or plant diseases.

Cotton (China) Shanghai, China. 9-6-19 pp 111-112

Production estimated at from 1,500,000 to 2,000,000 bales per annum, some higher? Also estimated that 26,000,000 mows might be grown, or over 6,000,000 bales. China reckoned in 1916 as fifth on the list, producing only 3.1 percent of world's cotton crop, with the United States producing 66.4%. But this probably means commercial crop that goes into trade or export. Domestic consumption in China as not in the United States, spun and woven in the home. Effort in north China to secure small spinning machines. See Mr. Forester. Importation of manufactured goods increasing but export of raw cotton declining? This the condition in 1916. China second in importation of manufactured cotton, first in importation of yarn, 45% from Japan, 25% fr India, 25% from Hong Kong, mainly English and India. Piece goods 50% from England, 20% from Japan, 10% Hong Kong, 8% from United States (in 1913?)

Upland cotton planted in rape has produced many small prolific plants, but big boll variety used and no bolls opened. Individual small boll plant with 5 open bolls showing that much earlier maturity would be possible with small boll early variety and that interplanting of Upland cotton may be possible.

Grown in small fields all along line north of Chuchow. Planted flat like beans and other crops in this region. Bed system of culture around Shanghai and Nanking not used in this part. Lands being plowed with animals. Open prairie country reminds of Texas or Kansas.

Upland type planted over mountains west of Chuchow not King, though some plants seem much like that variety. No bolls of full size even for King. Not Peterkin type. Seeds fuzzy, deep olive or blue-green or brighter blue-green. No flowers with purple spots. Many examined but none found. Natives report that cotton came from stock sent in to Mr. Aberley by Mr. Reisner, but variety not known. Similar instances of supposed or claimed introduction of seed with native varieties in Mexico, Cuba and Hayti leave room for doubt of such reports. Easily believed, if only a little cotton has been brought in, that new stock has been secured. Bolls taken from numerous plants to be counted.

Said to be large ~~in~~ district west of Chuchow with thousands of acres of vacant land, not repopulated since Taiping Rebellion 60 years ago. Likely much of this could grow cotton, and of Upland type like that at Chuchow or imported variety.

Experiment at Chuchow somewhat overgrown but with many very fertile plants, and full sized bolls in all Upland varieties. Especially fertile at end of plot which is on low terrace and end had better drainage. Best that could be had but not too much for best results at this end of plot. King, Trice and Acala with open bolls and good lint.

Between Pukow and Chuchow occasional fields, often very small, and only 5 to 6 inches high. Other crops also small, including the rice. Probably too far from town to get fertilizer. Cotton and sesame sometimes together.

If pulling plants were done leaves would fall off at first picking over. One plan might be to pull and lay in light crates with bamboo poles. Plants would flatten down gradually. Would be very flat and pile more compactly in few days, when first picking could be made. Women probably would do this at the house, and stalks would be piled for fuel. Bolls also would supply fuel.

Need to have short chapter at beginning on general classification of botanical types of cotton. Asiatic, Upland, Egyptian, Sea Island, Kidney, etc., in order to define Upland as botanical type. Not possible definitely to limit the Upland series, but quite definitely contrasted with the types mentioned above. Refer to large number of cultivated species and varieties, extending throughout the tropics. Few plants, if any, more widely cultivated though only limited regions furnish commercial supplies.

Raised rather extensively in low country between and Tientsin. Plants generally rather small but sometimes full size, 2 to 2-1/2 feet, usually 12 to 18 inches. Upland admixture obvious in many fields. Likely to be found in most. This factor tends to reduce advantage that Upland varieties might have otherwise in not crossing with Chinese.

Small clothes-wringer gin will put through 70 to 80 catties a day of seed cotton. Consists of small iron and large wooden rollers, revolving in opposite directions.

In considering the adaptation of American cotton varieties to Chinese conditions, account must be taken of the probability that most of the stocks that have gone to China have been mixed, and even in cases where good seed has been secured the usual procedure has been to plant several varieties together for purposes of testing, with the general result of crossing and often of picking the seed together at the end of the season. The results of each crossing and mixing might not be very strictly apparent in the next season since the first generation of hybrids usually is intermediate between the parent varieties, but in the following year a much wider range of diversity might be expected in the second generation of hybrids, which often are very diverse, and likely to include many reversions to small-holled ancestral forms that have been suppressed during the period of selection. The effect of crossing may be described as reverse of selection, in the sense of bringing back into expression characters that have disappeared or become latent when a variety is bred to a uniform condition.

Thus it is possible to understand that much deterioration may have resulted in China merely from the mixing of American varieties together.

Mixing with Chinese Upland, another cause of deterioration not hitherto recognized, is the crossing of American varieties with native Upland varieties which are cultivated in China. In some districts alone, but much more generally as a small admixture with Chinese varieties of the Asiatic type. The fact that genuine Asiatic cottons do not cross with Upland varieties would be a

practical advantage if the native Chinese represented pure stocks, but the admixture of native Upland is general, almost every field around Shanghai, etc. having at least a few of the Upland type.

Between Tientsin and Peking, a few miles out near Tientsin, large acreage of Upland type growing as small plants only 8 to 10 inches high topped back like field visited at Chunliang Chen but some fields of larger plants.

Refer to acclimatization as process of adjustment, assisted by selection, back to normal behavior. Apparently is distinct need in China, involving necessity of ~~securing~~ knowing normal types and behavior of stocks.

Cotton (China) Tientsin, China. 9-15-19 pp 144-145

The very rapid expansion of the Chinese textile industry naturally is being reflected in a greatly intensified interest in the possibilities of increased production in China. At the Chief centers of manufacturing activity at Shanghai and Tientsin associations of Manufacturers have been formed for the direct purpose of improving the production of cotton and even at outlying places such as Nantrugchow and at Wusih, progressive millowners are engaging in extensive agricultural and educational efforts, through schools, experiment stations, etc., in order to improve the conditions both of manufacture and of production of the necessary raw materials in contiguous territory.

In this respect, a contrast may be noted in the development of the cotton industry in comparison with United States where industry developed its two branches in separate regions, northeastern states drawing all materials from the south. Even greater contrast with textile industry of Europe separated by thousands of miles from chief sources of raw materials.

Central Experiment Station has stock selected for about 10 years for length and quality of lint. Serves as example of mass selection. Has not resulted in uniformity but has maintained high standard of lint quality that would be very satisfactory for practical use, but could be made somewhat better. Chief discount on existence of numbers of inferior plants. Smaller bolls, are producing little, and some freaks, but most of these have rather good and abundant lint.

Experiment with Upland stock cutting off all flowers after middle of August.

At Central Experiment Station 1200 to 1300 lbs seed cotton obtained on good fields from Upland selected stock.

Very careful treatment of plants in some of the Experiments hardly to be duplicated on large scale of field planting. Handfuls of fertilizer fed to individual ~~large~~ cabbage plant. Garden culture as distinguished from field culture, but not likely to be conducted on field scale.

Chinese cotton mills listed p 183 British Chamber of Commerce Journal, Shanghai, Sept. 1919. Total of 1,634,443 spindles and 8,214 looms in 52 mills.

Mr. Foster states that cotton is grown in large fields about 25 miles north of Yung Ping fu near Great Wall, northeast of Tientsin, about 100 miles. Plants small, of Chinese type, district seldom entered by foreigners.

Cotton (Chinese) Paotingfu, China. 9-22-19 pp 161-162

At Paotingfu Agricultural College plants ~~were~~ well growing and heavily fruited. Bolls full size, robust and slender forms represented. The former with strong, upright fruiting branches. Plants topped at about 2 to 2-1/2 feet. Also all vegetative branches and tips of fruiting branches cut off. At least two topping operations.

Droughts of four to five months occasionally. Usually dry in July and August, rarely from March to August. Usually rains in July and August. Early growth has to be by irrigation. Wells usually 20 to 30 feet, sometimes only 10 feet. Along river machines used yet no diversion systems. Cotton planted sometimes, but rarely between broad rows or wheat. Usually one crop system in this district.

According to Dr. Lewis at Paotingfu, the best cotton is supposed to be raised at Pingu, east of Peking. Said to bring a higher price and supposed to be whiter and have longer staple. Nothing said of it at Peking.

It it rains in 30th month (April), cotton is planted at once. Crop every year around Changte Ho. without wheat in winter Millet usually follows wheat. Some farmers plant cotton altogether, but most of them raise millet after wheat. Wheat usually sold. Only the well to-do eating wheat, but great bulk of common people eat mostly millet.

In mountain country north of Hankow, (reached at daylight from the north) cotton is subordinate crop, but is raised generally in small patches, either in some of the terraces or on higher slopes, sometimes in very steep places. All the rice land terraced generally with earth walls - sometimes stone. Only Asiatic type seen. At Kwangshui out of mountains into lower hill and gentler slopes with larger areas of cotton and larger growth.

More abundant about Luikiachow (shau?). Some fields with large plants three to four feet high, very slender late growth, probably with leaf-hopper disorder. Land level but less rice as most of the fields have been plowed. Cotton continues abundant to Siaokan, and becomes even more abundant further south in Upland places or on terraces in alternation with rice and buckwheat. Bed system often used for cotton or for buckwheat as around Shanghai.

Reached Hankow 10 o'clock Sept. 27th.

Experiments with	broadcasting	160 catties (seed cotton)	) Up-
	drilling	130 catties 2-1/2 x 1 ft	)land
	hills	120 catties 2-1/2 x 1-1/6 ft.	)

? General culture about Wuchang two crops wheat and winter and broadcast cotton in the wheat before. Experiments was broadcasted and covered or trampled with foot. Experiments with row spacing gave 2-1/2 feet as best distance.

Cotton (China) Hankow, China. 9-30-19 pp 196-197

Cultural attention of crop planted after wheat consists apparently of one or two hoeings or weedings. Crop raised at station with imported cultivator, with plants in rows, but results were better with broadcasted Upland (Trice) than with row or hill plantings. The broadcasted plot was being cleaned of weeds with light, narrow hoes, the blades only about 3 inches wide, a convenient instrument for working with plants close together. The fact that cutting out of weeds by hand would be necessary need not be considered a fatal objection to the Chinese method, unless it should be found that too much hand labor is required. The saving in previous operations of preparing and planting would need to be taken into account. Good stand of cotton would protect land, and in some regions the weed growth might be very slight, so that little care would be needed. In any event, it can be said that the only work given to cotton sown broadcast in wheat in China is hoeing out the weeds, and that good crops are secured in this way when the conditions are favorable.

Ginning by small roller gins worked by foot-power. Machines cost $40. in upper country. Quoted at $34 at Hankow. Two establishments seen at Hankow. Rate of ginning at Changte Ho given as 50 catties per day per man. Said also that gins are manufactured at a place called Si Kwan, near Changte Ho. See specimen of ginned cotton from Changte.

Shensi cotton dirty because picked up from ground. Farmers mostly grew opium and are not experienced. Cotton allowed to fall on ground and picked up. Also in traveling often injured. May be inch spoiled on outside of bales which are not very compact. Would be less difficulty in this kind ~~had~~ with compressed bales.

Believed that (native?) Upland around Shazi not so strong as native Chinese. Fiber considered long enough but on account of weakness it may bring lower price than native Chinese. This idea of Upland not found near coast, at Shanghai or Tientsin.

All varieties have matured bolls at Lakeside near Yochow and all have open bolls except Egyptian. Sea Island rather well fruited but few open and these all seriously injured by recent rain. Pink boll-worm and other insects very bad.

Cotton (China) Hankow, China. Oct. 2,1919 pp 202-203-204

Though rainfall and temperature conditions probably are somewhat more equable in the cotton regions of China than in the United States, there is still a very wide range, since it is possible for the same districts to have their crops ruined by droughts in some seasons and by floods in others. Also since more of the Chinese territory is wet the danger of flooding and of injury from wet weather in the harvest season is greater, as well as from insects that work in humid conditions. These handicaps partly counteracted by labor to pick very frequently or to destroy the parasites that can be treated by hand labor. Also lower yields may be tolerated and cotton still grown under conditions that could not be considered possible in the United States.

Also summarize reasons for supposing that no very rapid change of production conditions is likely. Stations exist but conditions are adverse and problems new. Men being sent abroad but do not get practical contact in most cases. These difficult to get except by those who are able to communicate freely and take actual part in work. Most Chinese sent abroad belong to literate or student class who have done no actual labor at home and have had no direct contacts with agricultural conditions or practical problems. If comparison is made with United States can be noted that our ~~status~~ stations in States often worked for many years before approaching the practical issues or developing new facts or applications of practical value.

Idea that American Upland cotton has to be spaced widely - 2 to 3 feet - of course gives very misleading results with respect to possibilities of Upland under short season conditions in China. Where plants grow large and luxuriant as result of wide planting they naturally give impression that type is very late and season is too short to open. If plants remain small, idea is given that yield must be low for such conditions as long as it is supposed that plants can not grow closer together.

Results at Provincial Experiment Station, Nanking:

Lone Star	94 gin per mo equals 250-1/2 bales
King	96
Miller	84
Cleveland	84
Cleveland Big Boll	86
Ayt sunfl.Exp.	66
Laythis Imp.	72

Last year Miller 128 jin(?) per mo. last year Crop now well open, Oct. 27th, but many plants with several unopened bolls.

District being reclaimed around Nantunchow, about 200 miles long and 40 miles broad. Sections previously occupied but operating quite generally. Complaint that Chang is taking land away from the people. Owners given a few dollars and told to get out. Cotton said to be better this year than around Thugchow. Production of cotton rapidly increasing. Most active cotton center of development is Tung Tai. Being sent out by boatloads in places where little was grown 3 years ago. Land has gone up from 10 to 15 strings of cash, less than $1., per mow to 50 to 100 tiao per mow - about 300 per acre to 500 - Direct result of cultivation of cotton in this district. High price of land dismays natives who have no land, no hope of ever being able to buy. Best lands generally owned by people who live in the towns. Landowners may live in country surrounded by 200 to 300 tenants, forming a rural village. People may live in villages for protection and go out to till land, but there are some districts where people live scattered by families. Some may own land while others are tenants. Importance of a man measured by number of mow of land owned. A man with 300 mow considered very well to do, rather well to do. Greater distinction than owning section of land in United States. Rich families also hoard gold, recent robbery said to have lost $500,000 worth of gold. May have been hoarded for generations. Several people killed. Money may be used for buying more land, but not for other purposes.

"But there is a cotton which grows in a certain part of China and of which there are a few plants being experimented with, which actually grows a brownish color naturally. A cotton that might be spun into khaki cloth without dying and theremay be a future in that.

From "Foreign Efforts to Improve Culture".

"There is a little pink worm that comes out of the seed before the boll opens. The worm comes from an egg that is laid in the heart of the boll by a fly or a beetle. The insect pierces the boll and deposits an egg inside of a seed. The egg hatches and out comes a worm. Of course it eats the seed in which it was born and then eats its way out through the cotton. In doing so it stains the cotton a pink-yellow color and if it were not for the fact that the cotton rots it might be possible to cultivate the worm so as to produce a cotton already dyed pink. But that would involve finding a market for pink cotton so it is hardly feasible." "From Foreign Efforts to Improve Culture".

Native varieties apparently suffer less from leaf-roller, though not free from attack. All Chinese cotton on drier land where plants are smaller, so comparison is not direct. Perhaps the smaller leaves afford the insects less opportunity.

Close to Lukiapang in beds like garden vegetables 8-10 ft. wide, bordered by a row of beans, leaving 4-8 ft. of cotton sown broadcast, the cotton smaller and paler than the beans, ~~in~~ Plants small, in some places only a few inches high, and no promise of a crop.

Beans on side said to be for wind protection. Shanghai cotton said not to be "chicken foot". Chinese farmer counts on 3 bolls to plant average -- 1 picul 133 lbs. seed cotton per ~~Ino~~ mo (1/2 acre) or 270 lbs. lint per acre.

Near Nanking ?? Planted in beds in rows foot apart plants 8 in. in rows. On higher ground cotton much better than on lower land where it was planted with wheat. Several plots planted after wheat (about May 20, not very good, have put ~~out~~ on little, but not worse than cotton planted in the wheat. Fertilized with bean cake. Planted about May 25? as quickly as possible after wheat -- in 3 or 4 days.

Planting of beans at sides of beds, usual around Shanghai, and said to be for protection against wind, finds another cause in fact that outside rows placed lower in the furrow, do not grow well and often fail to yield any cotton. Cotton seems to do much better on dry ground or with adequate drainage on high beds or mounds 1-2 ft. above general level, as where old grave mounds have been leveled.

Shanghai cotton crop about 1,000,000 piculs (250,000 bales) composed of Kingsan, Fengyen, Nanwei, Chuansa, Chading, and Nanzieng, districts of outlying places. Nantungchow district about 900,00 piculs, composed of Haimen and Tsung Ming.

Cotton competes directly with rice in some places as around Shanghai. Wheat could be raised in winter in cotton land, as in rice land, but question whether large crop could be obtained in this way. One of the questions to be worked out. Expansion of cotton production in China likely to be gradual because numerous problems have to be worked out. Production of food-stuffs can not be much restricted but cotton in nature of a food crop. Enumeration of problems, not possible to carry over methods from any other country because of different conditions.

Variation with broader leaves called Gaga, said to mean duck foot, Said to have yielded more last year than chicken-foot.

Raised in smaller quantities south of Kashing often in mulberry orchards. There often planted in double rows a few inches apart one double row on each side of bed for mulberry trees.

Raised in mulberry orchards near Hangchow also in open Plants larger than about Shanghai and earlier, bolls open half-way up. better in rich shade ? Scattering Upland plants seen. Bed system used 8-10 ft. Water standing in furrows Picking in water ankle deep Small bottle shaped basked used.

Planted on canal banks, rather extensively in one district between Kashing and Shanghai. Rice grown in all the fields. Canal banks affording only land dry enough for cotton. Whole cotton belt coast region around Shanghai primarily rice country or market gardens around Shanghai.

Said to be no white flowered plants in stock grown about Hangchow on the reclaimed land, though occassional Upland plants were seen. Fiber of generally rather good quality in stock examined at station of the reclamation company (see specimen of selected locks). Differences are notable not only in length but in roughness of fiber.

Cotton said not to be so strong as American, doubtless refers to spinning tests with the ordinary mixed quality of fiber. No testimony of greater strength among textile interests at Shanghai.

The quantity of seed sown per mow is 6 to 8 katy "Yeh", Production of Chinese Cotton & Its Improvement, Yeh Yuen Ting, University of Nanking Magazine, January, 1916.

"Miller" Upland variety, a long staple some fully 1-1/4 some ~~and~~ only 1 inch. Stock said to have been grown at Nanking Provincial Agricultural School for three or four years. Probably could not be used in small quantities in China. Might find market in Japan? Could such cotton be mixed with short for low counts? Might be serious question in starting long staple industry in any part of China. Could it be used readily for hand spinning by native methods of beating out? Is Sea Island handled same way as short fiber among primitive peoples?

Rather dry land terraced near Puchin, some not used for rice. Some terraces 8 to 10 feet high held by grass banks.

At Nanhsuchow two types, short and long (See Specimen) two kinds of the long white seed that stick on and black that separate easily from the lint. The latter one said to be planted. Long lint used for making thread and short for wadded garments. In Chali brown cotton still grown. Plants said to be of low Chinese type. Brings about 1¢ more per catty. One hundred miles south of Pao Ty Tru trousers made of this said to have been worn three years. At Nanhsuchow yarn being imported from India. Local cotton (seed cotton) at about 12 coppers per catty, (6 cents U.S. for seed cotton) at the present time.

Cotton (Chinese) Peking, China. 9/18-19-20/19 pp 153-154-155

Several kinds grown at Central Experiment station from different districts. The following secured:

Tang Chi district, Chile province: Varied in foliage and stem character. Broad leaves and green stems and purple, narrow leaves with green and purple stems.

Huolu district, Chili province: Large number of native Upland some with large bolls. Surface very smooth. Hindi-like lint of some plants very long. Chinese of this district broad leaves with purple stems, larger bolls very pale in color and with deep grooves in carpels at end. On one plant four-locked bolls.

Hsien Shan, Chekiang province: Like last but somewhat lower plants and smaller leaves. Four-locked bolls more numerous.

Shang Chai district, Honan province: Small sub-prostrate plants scarcely half the size of preceeding. Bolls often four, on some plants, mostly four. 1 to 2-locked and 1 to 5 locked. One plant very close jointed, five strong vegetative branches within 3 inches of main stalk, low down, short jointed, compact, putting out vegetative within inch from the ground. Bolls with conspicuous oil glands against very pale surface. Bolls on vegetative from bottom 3,4,3,4-3-3-4,4,4,-3,-4,4-4-3,-3-3-3,4,4,-4,3,-3,4,4,-4,5,4,-4, 3-4, total 30 bolls on plant less than two feet high. Bracts nearly entire above No. 2 plant. No. 1 small square bolls. Small plant bracts very slightly toothed. Plant 3 more upright larger plant with pointed bolls and distinct teeth. Lint long and silky but sparse. Whole row tends in this direction. No stiff, coarse lint.

Nantung chow black seed cotton: Green and purple stems, short and long lint, different forms of plants and leaves, some very narrow. Lint long and sparse or short and abundant. ~~Is~~ Flowers yellow or very small with white spotted petals. This plant with very abruptly beaked bolls. Some plants small, compact, fruitful and early, others tall and unfruitful or very late with no bolls or none open.

"Nantung-chow chicken-foot" Has fewer narrow leaved plants than preceeding "black-seed" stock. Perhaps ~~likely~~ labels reversed. Selection of broad-leaved, purple stemmed plant with large bolls and good lint (Photo). Also purple stemmed plant with slender bolls and very short, very dense lint (Photo).

Upland (native?) type in Chinese cotton from Huo Lu district showed very general similarity of foliage and boll characters, much like Hindi with bolls of similar shape. No flowers with spots. This in Hindi may be derived from Egyptian mixture. Six plants selected to show boll. Four Photos 29, 30, 31, 32, large camera.

Not cultivated in vicinity of Peking according to Mr. Hsieh Solag. None seen for 20 to 30 miles out on way to Paotingfu.. First field Chinese cotton.

Cotton becomes important crop north of Chochow, miles below Peking. All Chinese type but with scattering Upland in all fields close enough to be seen in detail. Also south of Chochow in narrow lands 12 to 20 feet wide, like beds around Shanghai.

Exchange of seed requested by Paotingfu Agricultural School. Yellow Asiatic varieties, some apparently good, might be secured.

Samples of several brown stocks grown at Paotingfu from neighboring districts several shades represented. Lighter shades, seem l longer or to have longer individuals.

May be less drought resistant than Upland. Occasional Upland plants in Chinese fields seem fresher and greener, but may not be fertile. Close planting, broadcast system of doubtful value for dry country, but might be justified as fallow crop in irrigated district where growth needs to be restricted and cost of early cultivation would be avoided or paid by preceding crop, which could be considered as a nurse crop. If not desirable in solid form, irrigation furrows could be run through later in season, leaving beds or ridges with plants standing irregularly, but not inaccessible to weed pulling and picking.

~~Exclusive~~ Extensive plantings around Changtingfu, between railroad and walls of city about one-half mile space almost entirely cotton, for two miles or more, then abrupt changes to vegetables and other crops with cotton occasional, but becoming dominant in places, so production of district must be large. Several miles north of Kasyihshen fields with large proportion of Upland plants, and some that appeared to be entirely Upland. Country appears drier and more like Texas. Kaoliang more general crop than farther north. Cotton appears to have suffered from dry weather. Plants seem less leafy, mostly 1-1/2 to 2 feet high but many very slender and some dry and dead, suggesting root-rot or unfavorable conditions. Country of more trees, mostly populars and willows.

Smaller growth in comparison with Upland ~~and~~ a general feature to be noted; ~~also~~ along with smaller bolls. Leaves and flowers also smaller. Small bolls require more labor for picking and in Chinese types the need of labor is further increased by prompt falling out, which is general if not universal. Some plants seem to hold longer and even hang somewhat from the base of the lock. Color of Chinese fields generally yellowish green in first season. Lighter than usual in Upland but in moist places deep dull green color retained to end of September.

Fields north of Kaoyihg\hen mostly with no large admixture of Upland, but some usually seen where ~~re~~ n close enough. Some of the large Chinese is 3 to 4 feet tall, many fields two to 3 feet, and many smaller. In places with poor stand the plants are likely to be greener, showing that color is connected with vigor of growth as in Upland, but Upland often remains dark green where all of the Asiatic has turned yellowish. Beans and Kaoliang, the other important crops in this relatively dry regions, suggests possibility of cotton in Kansas wheat lands, planted in spring a few weeks before wheat harvest, depending upon rain, perhaps to germinate. Jujubes principle fruit trees of these dry districts. Occassional small-leaved elms, probably Ulmus pumila, which is growing well at Bard, but mostly willows. Has this been introduced? Irrigation of fall plantings now underway in small enclosures of few square yards as in Egypt, these enclosures being flooded and leveled at same time. Upland plants conspicuous in some fields on account

of red color of plant, not assumed by Chinese. North of some of the fields still more distinctly drought stricken, plants small and foliage wilted.

Selection and art that the Chinese seem not to have developed, and certainly not applied to cotton. Not only do fields contain entirely miscellaneous assemblages of Chinese forms, but most of them have also an admixture of inferior Upland, like the Hindi cotton of Egypt, that represents a serious contamination of the Egyptian type.

Regarding the supposed indehiscent forms of cotton in Asia Minor and Turkistan, information should be collected to show that this is a normal characteristic. Have we viable seed still in the collection? Ask Marshall and Lewton.

Country becomes more rolling, drier and more treeless north of with rather extensive terracing in places, supported by grassed banks 3 to 4 feet high. Cotton raised on some of the terraces. Foliage very light colored, but not so dry as in some fields. Buckwheat very small. Nothing to show irrigation on these terraces. May be merely to hold run-off. Some have distinct slope while others appear level. Railroad cuts show sterile, light-colored subsoil. Beans growing wild on surface of cuts like cultivated species with long pods - perhaps cowpeas? May be chance soon from fields above. Many long, narrow terraces, mere "lands" cultivated lengthwise, but often with 2 to 3 feet difference in elevation. Usually 4 to 6 rods across but several times as long; sometimes 100 to 200 yards, with abrupt differences of level, usually not more than 2 feet, but often 3 and sometimes 4 or 5. Occasional sand-hill areas not cultivated.

Soil generally a light loam, easily worked and many fine fields.

Brown and white in same field at Chang Te Ho. Fiber generally very short, some of it abundant; mostly very rough and stiff.

Green bean flour rolled out in large white cakes 6 in. thick after grinding in water. Used to make macaroni with greenish color.

A few miles south of Sin Siang another distfict with cotton planted extensively on rather light-colored soil like that around Changte Ho. Much localized by districts. Plants generally smaller than farther north. Fields continue less numerous down to the Hoang Ho Bridge.

Buyers said to object to American cotton on account of lower percentage of lint. Mr. Moh has offered more for American cotton to overcome this discrimination. Small Chinese farmers always sell cotton in seed, the price depending on market conditions, but ? usually 1/3 of lint value. At 30 teals, 60,000 cash per picul for lint. One picul seed cotton brings $12 - 13? 1/3 of 30 equals 10 teals equals 20,000 cash. Lint percentages in Chinese cotton run as high as 45, but usually 36 to 38%. Would seem that seed cotton should bring more, seed being not without value. No regular recognition of percentage by paying more to the farmer, but buyers may pay more to secure it. Farmers who sell seed cotton do not get seed back for planting but buy seed from the ginner, but said to be some farmers who select big bolls and get the ginners to gin their cotton separately. First buyer (middleman) takes cotton to gin and pays for ginning.

1. Cotton hong = company buy cotton and gin it themselves.

2. At Lao Ho Ko communications difficult and farmers gin at home on small gins.

3. Beyond Lao Ho Ko farmer takes cotton to ginner and pays fee taking cotton and seed away.

4. Middleman buys from farmer, hires men to gin cotton, owns gin instead of hong. Sells his cotton to hong or to factory Above 4 marketing systems used in Central China.

Recognized price for ginning 2 coppers per catty of lint. Seed bought at 2 coppers per catty. Naked seed sold higher than f fuzzy seed. 2 coppers per catty equals 150 coppers for 100 lbs; 148 coppers to $1.00 Mexican equals about 1 silver cent per lb. for seed and for ginning.

About Tsao Yang exchange 1 catty of oil for 8 catty of ~~pure Sin~~ foreign cotton seed and 1 catty of oil for 12 catties of Chinese seed. This exchange made by Buyer, or by ~~customer~~ crusher, the seed being exchanged instead of sold. Middleman may buy oil and do business with farmers. This would indicate much higher oil content of foreign seed. (Cotton at Ichang said to grow very high, over man's height. Plant 3 catties per mo and get 300 catties)

Cotton (Chinese) Hankow, China. 10-1-19 pp 199-200

Place called Ching Chow famous for Chinese cotton. Farmers of this district are said to hoe their cotton ~~about~~ out 7 or 8 times. Place belongs to Wang Kiang Hsien. Cotton called Cha Hsieng, meaning native country 家鄉 cotton, 洋 because people went to Szechwan so-stated and saw their cotton ~~then.~~ there. (Might come also from some other cotton being introduced?) Around Hankow farmers said to hoe cotton only 4 times. The Ching Chow cotton said to be free from disease. Farmers said to be honest and not to add water. Water content of their cotton not more than 5 percent. Not a large district, 65 to 70 ~~miles~~ li long, 10 to 20 li wide, but farmers devote themselves mostly to cotton, alternating with wheat. Cotton named Kia Hsiang equals 家鄉 . One district formerly famous for cotton called Filiel Village, Get Filiel Piety District 孝感縣 . Farmers have ruined the market by excessive adulteration with water so Chinese and Japanese buyers now avoid them.

Notes on "Cotton Cultivation in China" pamphlet published by North China Daily News & Herald, Jan. 1917 (anonymous) (Report of series of articles).

Chap. 1. "How China Might Lead The World". Possibility that China might become greatest producing country. "Cotton is grown in such an absurd manner that it is difficult to estimate the real acreage in a given district". Estimate 2,000,000 bales. "Experiments made in the vicinity of Shanghai during the past few years show that the yield per mow can easily be increased threefold simply by selecting seed, by preparing the land in advance of planting, by the use of bean and other fertilizers within the means and reach of all Chinese farmers, and by properly weeding and caring for the plant from planting time until the plant has matured" (p-6).

"There is no question but that the yield of cotton can be increased, but it is still a question whether the quality can be improved to an equal fineness as compared with the American product. The mills may always have to import American cotton for their finer work. Experiments so far with American seed in the Shanghai district have proved practically a failure; the plant grows well and thrives, but the summer season seems to be lacking by one month, for the weather becomes too cold before the bolls have opened. American cotton here goes back to the Chinese plant in a year or two as the climate seems unsuitable." (p7).

Chap. 2. "How the Earth is ~~Watered~~ overtaxed", ascribes low yield and inferior quality to failure to rest the land. Condemns practice of planting in the wheat because land can not be given special

preparation for cotton. Wheat cut when cotton about 5 inches high considered waste of straw. "Disease and traits of cotton are hereditary, as in other plants, and humans. Cotton that is choked and smothered by other crops, whether wheat, or beans, or weeds, produces seeds that in turn will produce a poor plant. If but one crop, cotton only, were grown on ground that had been prepared and rested, absorbing nitrogen from the air (the soil gets no nitrogen when wheat is growing on it), and the poor plants are cut off and the ground kept free of weeds so that all the strength of the earth can go into the cotton, the crop will be at least three times that grown by the common Chinese method". (p12).

"The picking of cotton in the Shanghai district begins in August and continues to the end of October". "The more highly cultivated plant of America is often so trained that all the pods on the plants of an entire estate may open within a period of 10 days so that gangs of pickers may clean up practically the whole estate in a comparatively short time. Here it is different, and it always will be unless it would be possible for a foreign company to rent or acquire large tracts of land for cultivation on an extensive scale. When the average farmer has only 10 mow (equals 1/6 acre) or say an acre and a half at the most, it is a case of his family doing the picking, or if the farmer needs help he employs the children of his neighbors. The picking costs about 5 cash per catty of seed cotton and the children (most of the cotton picking labor is juvenile) go through the patch again and again, picking such bolls as have opened. The average yield per mow is 1-1/2 piculs if the land has been used only for cotton growing, and with proper fertilizing, but when cereals are grown in rotation the average yield per mow is only 85 catties. (p 32)

Seed said to be planted at rate of 60 to 70 pounds per acre. (p33).

Rate of ginning on small home gins said to be 20 catties in 10 hours at cost of 100 cash for labor. (p33).

"You do not need to go outside the settlement limits of Shanghai to find the soil being cultivated or mistreated, in a manner that is nothing short of criminal. The Chinese farmer plants two, even three, crops a year on the same plot of ground, and it never occurs to him that he is doing anything wrong."

From "How The Earth is Overtaxed"

Field at Nanking. Plants pruned back at about 8 in. to get more branches! Mostly with 3-6 vegetative branches. Chinese cotton said to be treated this way? Most plants have 3-8 bolls. About 2 ft. apart in the rows. Leaf rollers doing considerable damage. Leaf-hoppers very abundant and all new foliage rumpled. Flowers abundant but young bolls mostly aborting. Some have been punctured, by large bug, others apparently uninjured. Somewhat discolored around internal nectaries, or external. Weather dry at present, but no signs of wilting. Probably not shedding from this cause. Topping back seems curious idea. Veg branches have now been topped again, about 15-18 in. long.

Stock much mixed with a small-bolled sort, perhaps King. Many plants pruned before any fruiting branches had developed so have only veg. branches from the main stalk. Where early fruiting branches were left they often have 2-3 or even 4 well-developed bolls, often more than the remainder of the plant, indicating that this plan might have been rather successful if more branches had been left, especially with the small-bolled type, though others also have reacted in the same way. Probable that different kinds of branches not understood, and topping done when some plants had not begun to develop veg. branches.

Selection being conducted by students, basis not apparent. Some rank and unproductive plants have the red ribbons. If 4 or 5 fruiting branches could have been left on each plant results might not have been so bad but many plants that had the early veg. branches taken off have no crop.

At Chuchow distinctly inferior to Durango on one side and Lone Star on other, in being notably less productive. Nowhere distinctly superior as yet. Probably should be omitted in future.

Not productive in experiments thus far Very barren at Nantungchow.

Seems definitely less injured by leaf roller than other Upland varieties, though by no means immune, and more injured than Sea Island. In one planting the row is notably better than Columbia on one side and Acala on the other. Also somewhat taller in next series but difference much less. Some Acala plants ~~better~~ taller than adjadent Durango, but Durango not much more(?) productive than others. At least has shed most of its squares or young bolls hitherto.

In spite of apparent greater susceptibility of foliage, Durango is producing more late bolls than other Upland sorts. Some of these well grown. Showing leaf-hopper not necessarily fatal. How serious experiments must determine.

Cotton (Egyptian) Nanking, China. Oct. 21, 1919 pp 224-225

Has fruited well late in season during dry weather, at the top of the plant and at the ends of the branches. But no early crop as explained in previous notes, account of vein-blight disease. Only a few bolls open, but these show lint of excellent quality and length, equal or exceeding Sea Island. The indications of cool weather production by Sea Island and Egyptian suggests bringing cotton closer to California coast at points where this is possible. As very intensive culture of very high grade fiber could replace Sea Island completely if necessary. Tie up with Hawaiian Island study of Sea Island.

At Nantungchow shows leaf hopper injury more strikingly than other varieties. No prospect of being of use.

Vein blights still doing serious damage to Egyptian often attacking the bracts. Sometimes moves slowly or dries up before reaching base of bract. Not many bolls developing No case found of boll developing very far in an involucre where the leaf blight had reached the base. Suggests that this affection is cause of abortion Badly affected involucres often are easily detached, though flowering stage may be reached in involucres rather badly affected. Infection of involucres shows first on the margin and follows down a vein, though sometimes advancing more rapidly on one side of a vein than on the other. On some plants very young squares, and even the stipules around them are attacked. This disease seems to be even worse on fruiting Egyptian plants that are affected with leaf-hopper disorder though some of the small stunted leaf-hopper plants do not fruiting show little or no vein blight even on the leaves. Perhaps these not visited by flies, which are crawling about on the large fruiting plants, and may be partial to the Egyptian cotton, though frequent also on Sea Island which stands next, so that infection would seem certain if the plants were equally susceptible. Egyptian still shows little in the way of angular leaf spots of usual kind though a few of the old leaves are spotted.

Pima? at Nanking badly affected by leaf-blight and leaf spots, and largely defoliated. No leaves below, for 1-3 ft. from ground. Notable contract with Sea Island on one side and on the other.

Egyptian plant:	14th node branch	0	0	0	0	
	15	—				
	16	—	—			
	17	—	—			
	18	0	0	0		
	19	0	0	0	0	s
	20	f	s	s		
	21	s	s	o		
	22	s	s	s		
	23	s	s			
	24	s	s			

This plant holding squares better than neighbors. Many squares aborting when only about 1/4 in. long, turning black before falling. Many involucres streaked with vein-blight, often only 1-2 teeth affected. Very few Egyptian plants have veg. branches, while Uplands often have several.

Below Wusih coffins set about in rice fields and mulberry orchards, simply coverdd with thatch, or even without. Laid near water level. Sometimes ? built over. Large old grave mounds in same district sometimes several square rods(??) in extent.

Species said to be worst at Wuchang. (See specimen in small vial). Has small, greenish yellow moth, so stated at Wuchang Experiment Station.

At Nanhsuchow pink larvae injure much of the cotton. Emerge from the seed while being dried. Getting rid of the worms being one object of putting the cotton in the sun. Are these the true pink boll worm? Said to be a worm in every boll. Emerge in large numbers and fall to the ground under the racks where cotton is dried.

Control of leaf-rolling parasite by picking off, as described by Moh indicated as possible by fact that infestation often is greatly localized. Three or four contiguous plants badly eaten, and next ~~was~~ almost intact, especially smaller plants which may have escaped first infestation. Perhaps females of this species are somewhat sedentary. Egyptian cotton seems less affected than adjacent Upland row (King?). Sea Island perhaps least of all, strikingly less than next Upland row (Trice?) (and also very little vein-blight and angular leaf-spot on Sea Island.)

English mechanician going to Indo China to instal cotton mill machinery, and instruct natives in use, expects to stay one year.

In region south of ~~Shuntehfu~~ Paotingfu irrigation by wells as at Peking. Worked by windlasses with curved handles, two or three handles worked by as many men to bring up large bucket of water. Wells sometimes quite deep, but around Paotingfu usually not more than 20 or 30 feet. Gravelly subsoil in terraced region 15 miles ~~or so~~ south of Hantan around small villa ge on east side of track of railroad. Affords good illustration of terracing of gently sloping country. Extends to another larger place with extensive gardening and small patches of rice, the first noticed today.

Of 35 plants with open flowers 2 had flowers spotted, another row 4 spotted out of 18, another 1 spotted out of 12, another 0 spotted out of 20.

Fairly good crop on plants not pruned

Some plants with purple spots said to have

Large bolls likely to prove a distinct disadvantage in Shanghai-Nanking region. Even small bolled Upland (native ?) at Chuchow often had bases of seeds pink (with fusariam ?) though climate apparently somewhat drier than around Nanking.

Heavy growth at Nantungchow Suggested cutting off tops of plants to let in sun and allow bolls to open. Not a question of getting more growth but only of getting bolls open that have matured already. Cotton will fail to open in cool damp weather although the bolls may be fully matured. Refer to Kekchi cotton in Greenhouse.

Said to have been obtained from Govt. Where did Govt. seed come from? Very little Lone Star outside weevil region. If from North Carolina is mixed with inferior small boll. Cotton on hill found in October to have naked-seeded plants, probably from Mr. Moh (So? ed 30-station,

At Nanking produced one 3-locked and four 4-locked bolls with about 30 abortions, while Egyptian plants produced no bolls and Lone Star four 4-locked and two five-locked, with about same number of abortions.

Involucral nectaries only (Inside and outside) being visited by medium-sized orange red Bombus at Nanking, August 14, 1919. Does not enter flower.

Full set as far as available for Chinese Cotton Mill Owners Association. Send in Care of American Consul, Shanghai, and notify Mr. Yeh Yuen Ting, Chinese Cotton Mill Owners Association, 10 Hongkong Road, Shanghai.

(This is being done - Mr Yeh selecting the publication and buying those not available)

Plants here growing larger on middle of ridge of 3 rows also at south end of rows and have fruited more there, indicating advantage of early development. This cotton planted in May.

Suggestion of forms of diagrams for recording data, such as number of bolls and length of branches. Possible to combine boll and branch diagram by offsetting veg. branches on dotted lines from proper nodes, thus relation of veg. branches to height of main stalk, and relative development of fruiting branches to those of the main stalk would be shown. Examples could be given.

In relation to soils for cotton note also that prevailing idea of crops exhausting soil is largely erroneous. Based on idea that plants draw "food" from the soil whereas the soil is fed, or enriched by the plants. Longer the soil has been occupied by plant growth the richer it becomes. True that some plants remove special substances from the soil so that exhaustion ispossible. In this sense salt plants might take out all the salt if persistently removed.

The nature of varieties, to be explained and illustrated by reference to the human species. No two individuals exactly alike, except identical twins representing division of same fertilized egg-cell. But such cases show that much greater uniformity in the human species would be possible if descent were restricted to narrow lines, and such restriction did not result in degeneration decay and eventual extinction of the stock. May be doubted whether any close fertilized stock will survive permanently but many self-fertilized or line-bred stocks of the lower animals and plants maintained for many generations. That domesticated varieties of plants tend to run out eventually is generally believed and may be true of if sufficiant time is allowed, but they last for many years, and probably much longer than has been supposed, if proper methods of breeding and selection are maintained.

Experiments with bed culture as in China, to learn reactions of American varieties to this system and its possibilities of demonstrating effects of differences of exposure in early spring. In study paper sketch different cultural methods.

Allowance has to be made not only for varying behavior under different conditions, but for abnormal effects and injuries as by diseases and insects - Tomosis, plant lice, leaf-hopper, etc.

Are there general regional differences in lint percentages and indexes? Difficulty ~~of~~ with immature seed to be recognized and avoided. Do North Carolina yields and percentage averages run higher for varieties?

Refer to measurements of individual fibers, determination of strength and fineness not impracticable to determine spinning quality this way.

Combing may be done from sides or around the end so base of seed is shown in middle. Exhibit at Paotingfu, seeds arranged in rosette gives stronger impression of differences.

Chapter briefly summarizing the development of the Egyptian industry in the southwest would serve as an illustration of a series of problems actually encountered and the kinds of study that proved necessary. Would also serve to check over the different subjects that need to be treated in paper on general subject of study of cotton. In the introduction to such a paper it could be explained that it is not called methods of investigation, or other such title because methods have to be devised for each problem and it is out of the question to treat all problems in one paper, but only to recount features that have been noted in connection with studies that have been made. Paper lies between arrangement of parts, and general field of investigation. In case of Egyptian cotton whole advantage of uniformity was not at first foreseen, as basis of successful competition. Investigation was made merely on basis of learning whether this type of cotton could be grown in the United States, and if not, why not.

Special emphasis to be laid on familiarity with types as basis of selection and of judging results of cultural experiments, instead of score.

Left Nanking Oct. 29, 1919.

In going over this on other general subject. Books like Duggar, Smith, Field Crops, Earle Smith Agriculture, Etc., should be reviewed. Bailey's Encyclopedia, Etc., New Pitman (?) Series of industrial works, new edition issued recently? Hunt, Forage & Fiber Crops. The last includes score-card selection.

Tested at Wuchang Station in 1914-15 and then distributed in the Province (to 100 people?) with imported seed. No provision for maintaining local seed supply. Probably

On account of being earlier and more productive the other varieties seem more likely to be of value and more likely to replace successfully the Chinese type. Comparison needs to be made between Trice and Native Chinese Upland, not only to see which is better but to compare earliness, which might make it possible to judge in advance whether Trice is likely to be of value by being earlier and more productive than the native stock, which could be developed and made more uniform by selection.

Earlier and more prolific than other Upland varieties at Nanking, including King. Lone Star bolls too large and too close to ground to dry out and open normally in this climate. King and Trice growing side by side with obvious contrast in open bolls and also abundance of crop. Also Trice bolls notably larger, but lint of Trice so notably inferior to Acala that the possibility of developing early Acala selection seems very important. Try planting at Lanham. Acala is earlier than Durango at Nanking, in adjoining rows.

Only variety that needs to be considered at Nantungchow, with prospect of practical use. But experiments have not been crucial on account of rather sheltered humid place and rather excessive use of fertilizer. Experiment with topping not successful because of very rank growth of plants, and resulting forcing out of many vegetative branches.

Of American varieties in China the Trice appears most productive and on this account most desirable. Extreme interest of people in the new sorts and attraction of ~~first~~ first variety.

Apparently much superior to King (but one row of King replanted? with Lone Star? also 1 Sea Island plant in 2nd? Egyptian rows). Bolls apparently more numerous and larger, though many plants barren or with only very small bolls. Behavior of all varieties so extremely irregular that little confidence can be placed in results as indicated by yields, though Trice rows seem likely to turn out by far the most. Proximity to Egyptian may constitute an advantage here.

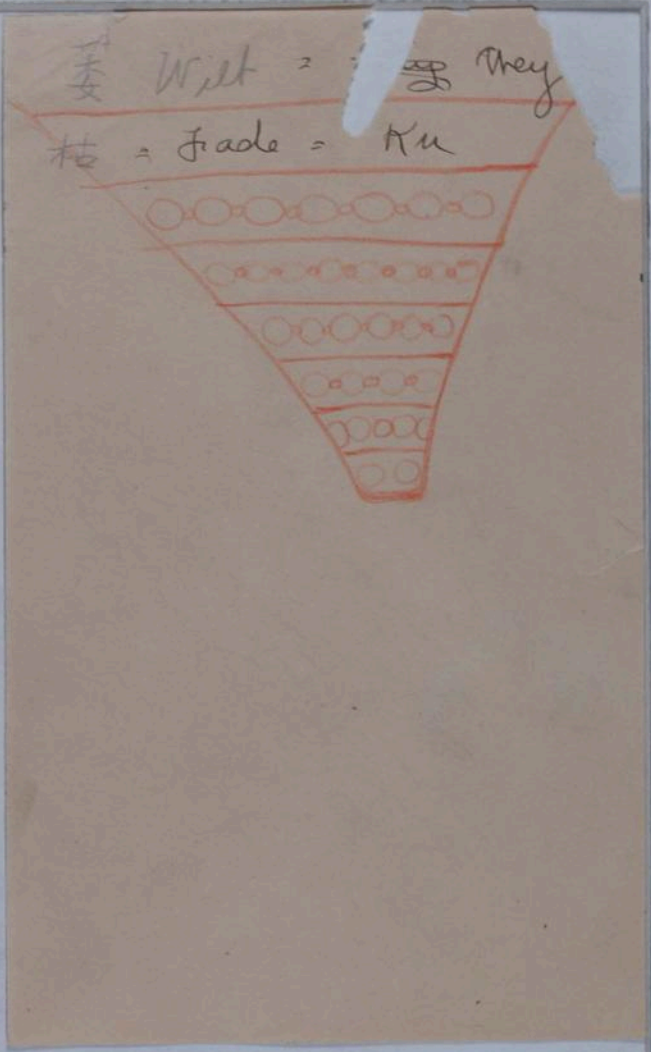
Admixture with native Chinese. Plant with 19 bolls another 22 certainly much more productive than Asiatic type. This ? but late opening of bolls considered serious Not liked on this account also fiber said not to be very white -- yellowish. Perhaps "Nankeen" ? Bolls usually not open. Some plants do not have red pulvinus Very pale folia ge suggests native Pima.

In native fields at Paotingfu called by farmers foreign cotton. May be different from "Native?" Upland type as some of the bolls are very large, ~~This~~ that is full medium size of American Upland, larger than King, fair sized Trice. But other plants have small native upland bolls.

Experiments suggested with Upland cotton planted in the wheat like the Chinese. Would be in the nature of single stalk treatment. Native Upland cotton mixed with the Chinese ~~Durango~~ always grows single stalk and is very productive, but said not to open in time. Is this true around Nanking? Are there such plants in the "chicken foot" field planted by Mr. Reisner?

At Paotingfu one stock of Upland alleged to be Trice was largely slick-seeded 35 plants out of 40. Another stock, five lick seeded, 35 fuzzy. May have been selection of slick-seeded plants last year, otherwise remarkable transformation of stock of any Upland sort! Many plants with very sparse lint.

Upland specimens sent by Rev. James Watson from Shensi apparently belong to same type seen in other places with very green seed. Letter to Mr. Reisner states that this type of cotton is the only one grown in district San Yuan (or Lan-Yuan?). The plants are rather large and rank and some of the bolls are of fair size - over 1-1/2 inches long. Some bolls with 5 locks, others with 3.



COTTON (China) Miscellaneous Notes On Small Cards.

Cotton (Brown)

Said to be dyed with red clay, at Changte Ho, to imitate natural brown color.

Cotton (Brown)

Two kinds of cotton cloth bought at Kiukiang, one (2) brown said to come from Hupeh, another (3) white wash cloth material said to be from Nanchang.

Also very coarse net said to be made of jute.(1)

Cotton (Culture)

Has rained 10 days at Changshe this year at end of September or beginning of October. This likely to happen every 4 or 5 years. Said to be much more cotton farther south. Mr. Lingle introduced American cotton and corn about 20 years ago, in southern Hunan.

Cotton (Culture)

Stalks pulled up and ~~stored~~ stood in small shocks in country south of Yochow, early in October.

Control of pink boll-worm?

Cotton (Culture)

Double crop system of China renders agricultural status of cotton quite different. Production simpler, no preparation of land after wheat, simply hoed out once or twice. Short season

feature of Chinese sorts also very important.

Cotton (Culture)

Large part of present crop raised in the rice belt and much of it planted actually on rice land. The two crops often seen growing only a few feet apart, and even sometimes ~~bulk~~ Till of rice planted among the cotton when stand is poor or have a chance for a crop of rice in case the weather should be too wet for the cotton to grow. Planting of cotton in the humid regions contrary to present tendencies in the United States, but special reasons exist in China that have justified the practice in the past and may in the future. But leaves large amounts of cotton land unused.

Cotton (Drainage)

Question whether water could not be pumped out of cotton fields in some of the rice land districts to advantage - in some cases even pumped on the rice. Same machines could be used. Water table often too high.

Cotton (Artificial Drying)

Not necessary in northern districts, but generally in the more humid, southern sections. Picking goes on even with rain falling north of Hankow.

Cotton (Experiments)

Experiment station in each province is supposed to have one or more agricultural schools, and there are experiment connected with the principal schools with usually one located in the Capital cities of the provinces.

In addition to these general government has 4 cotton experiment stations (1) Nanking chow (2) Chanteho (3) Wuchang (4) Peking. Also Agricultural Colleges at Peking and PaoTingfu. One other? Nanking and Canton only foreign institutions with cotton work.

Cotton (Fiber)

Talk with Bureau of Markets about difficulties of long staples and suggest length of staple likely to be best under existing conditions. That is, how long can be mixed advantageously with present short cotton?

Cotton (Gin)

Two establishments at Hankow were seen in native quarter where foot power cotton gins were being set up. Said to be made there but perhaps only put together. Price $34, leather rolls $3.

Cotton (History)

In the province of Kweichow, southern China, numerous wild tribes were said to exist, called Miau-tze (
Several of these were said to raise cotton and to be skilful in

in spinning and weaving it.

Journal North China Branch Royal Asiatic Society, No. 111 Dec. 1859, pp 1-26

Cotton (Insects)

Injury from insects perhaps more serious with Upland on account of larger size of boll, entailing more damage ~~for~~ from each attack. Do all insects that attack native cotton also work on Upland? Question to be settled by special investigation. Picking frequently not objection from Chinese standpoint. Necessary to avoid stealing, which might be worse with big-boll cottons, being easier to collect a worth while quantity in a short time. Hence larger bolls might even be objection from Chinese point of view.

Gossypium (expressing oil)

Native process of extracting oil described. Ground seed with heavy stones, but these decorated with carvings. In neighborhood of Shanghai. Mrs. Little, 306.

Cotton (Pests)

Handling of cotton as short season crop undoubtedly represents favorable condition for control of pink boll-worm, if measures were taken. Also fact that fields are cleared early and wheat or other crops planted in the fall. Idea that land is more rapidly depleted by double crops largely a mistake as Chinese

agriculture goes far to prove. Fertility preserved longer, perhaps, than in any other country. System of fertility also more highly developed as described in great detail by Professor King.

Cotton (China)

Late in season fields of Upland and Chinese can be distinguished at once from a distance, on account of the Upland foliage turning red, while Chinese keeps green color till frost.

Cotton (China)

In China, as in other countries, cotton has achieved a complete peeminence in extent of use. In direct competition with silk, grass cloth and wool, all of which seem to have been native and to have been used in advance of cotton. (Refer to efforts by monarchs to popularize cotton?) May be considered as demonstration of greater availability of cotton. Seeing this to be the natural and inevitable course of events seems wise course to understand, appreciate and utilize cotton.

Cotton (China)

Cultivated commonly along tramway to Zik a wei. Baled in the village at end of tramway. Bags hung up and packed loosely. Plants being pulled up October 31.

Cotton (China)

Hu Shi (Sung Dynasty) shows that cotton was then a new introduction. China Rev. 19:260
17:240

Cotton (China)

Between Kienchang and Tu Kia Pu foreign cotton planted rather extensively.

Gossypium (China)

No prospect of Upland in Shanghai, least district? with large plants. Possibilities lie in direction of methods of growing small early plants to bear half a dozen bolls.

Gossypium (China)

"Cotton goods are made at home. They do not crease as our cottons do; they let in the air though like cellular goods, and are therefore very wholesome wear in summer; and they last for ever." Mrs. Little 304.

Cotton (China) Pao Ting Fu.

See Mr. Foster and Mr. Sam Dean, Princeton men, Y.M.C.A. Industrial Educ.

Seed cotton 20 coppers per catty.

Ground cotton 45 coppers per catty.

Catty about 1-1/3 lbs.

4600 coppers a year days of weavers.

600,000 people engaged in weaving.

$21,000,000 annual output.

All yarn imported from Japan, costs $14,000,000.

Spinning district about 20 miles from railroad.

Gossypium (China)

Upland suffers much more seriously from leaf ~~wither~~ roller. Never do much damage in Chinese. Sometimes defoliate Upland almost completely.

Cotton (China)

"In order to promote American cotton in Honan, the Industrial Commission has decided to buy 10,000 catties of it from the Government Cotton Experimental Station and has asked the Government to decrease the transportation fees." Millard's Review, Oct. 25, 1919 p 322.

Cotton (China)

Thread from Japan now paid at 405. Bale of thread double 215 teals against 125 teals three years ago. 440 catties.

Cotton (China) General.

Although extensive natural resources have been recognized, China has been studied chiefly as field of commercial exploitation, rather than as field of production.

CHINA (Cotton Notes)

China (Cotton) Disease.

Contrast with hybosis of plant lice which is worse in cool weather and ceases when plants go into rapid growth, even if insects are present. China disease does not develop symptoms in cool weather but is worse in hot.

China (China)

Idea of deterioration may be traced to growing of different varieties in experiments then using seed for field planting, which might be good in the first year and then show serious falling off.

Cotton (China)

Present prices September 15, 1919. $16 per picul, Chinese cotton and also American cotton, but latter sells more readily.

China (Cotton)

American picul
Chinese cotton
Said to cost
1 mow produces 1 picul 133 lbs cost $16.00 to produce.
1 mow produces 80 cattiescost $12.00 to produce.
Chinese cotton picked every day.

Cotton (China)

Problem of adaptation has to be studied under a wide range of natural conditions, and different behavior by cotton varieties. Compare different regions with parts of United States in relation to behavior of the cotton varieties.

Cotton (China)

first copy in many other papers original in loose leaf "Agriculture"

Titles for Outline (Cotton Problems in China)

Apparent Inferiority of Chinese Cotton. Small plant, small foliage, small bolls.

Supposed Reasons for Inferiority. Ascribed to adverse conditions, to bad cultivation and especially to planting close together, or with wheat or other crops, so that the individual plants could notmake full development.

Lack of Uniformity in Chinese Cotton. Real inferiority of product for spinning purposes not due to any of these supposed reasons, but to lack of uniformity among the plants and especially to lack of uniformity in the fiber produced. Other supposed causes to extent that they were real would reduce yield, but would affect quality or spinning value of fiber to a very slight extent not of a nature to be appreciable at all in the presence of the true factor of inferiority--absence of uniformity in the fiber.

Reasons for Frequent Picking in China. Climate wet and changeable; cotton likely to fall out and be soiled, especially if weather turns wet, added to danger of thieves. Cotton easy to steal in the night on account of white color. Large boll cotton could not be left on plants for this reason. Fields would need to be guarded and patrolled in most parts of the country. Hence in presence of adequate labor supply only part of wisdom to use it.

Drying cotton and adding water. Cotton first dried to get out worms then water added to restore weight. (Bad musty smell).

Bleaching raw cotton to improve color. Left out in dew for several nights and sun in day time. Probably reduces some of the discoloration of insects or boll-stain. But probably also tends to rot fiber.

Cotton in the Rice Belt. Shanghai, Nantungchow, Ningpo, Hangchow, Wuhsih, &c.

Two general cotton regions. Yangtze Valley cotton in rice belt. Upland cotton belt in Loess country of North China. Has this a Chinese name?

Improvement of Chinese cotton. A simple possibility of improving the Chinese cotton exists, through selection of pure stocks that will produce fiber of good spinning quality and satisfactory length, an inch or more undoubtedly could be attained, since plants with such fiber are to be found in most of the fields.

Difficulties of Applying Selection to Chinese Cotton.

Has to be admitted that Chinese type is not quite so accessible to improvement as our American Upland type. The fact that the individual plants are smaller means that smaller stocks of seed are to be obtained from select individuals so that increase of pure strains is slower and more time is required to make the n necessary comparisons of the superior strains with eachother so that the best can be separated. In the United States it has often been found difficult to get full stands of the Asiatic types of cotton in experimental plantings, but this may be easier in China where the climate is more equable and the habits of the plant better understood. Smaller size, individual plants may also mean that roguing may be more difficult and less effective; more plants have to be gone over to secure same amount of seed and individual differences may be harder to detect. In any event it will be necessary to develop a staff of really skillful assistants thoroughly familiar with the habits of growth and other external characters of the select strains that were being developed.

COTTON DISEASE (China)

Other limiting factors are of course to be recognized. Not only the pink boll-worm but several other insects, are very destructive to the bolls and even when the good yields are obtained the fiber is very short and irregular because selection is not practiced. But the leaf-club disorders in severe cases were found to result in a more complete failure of the crop than any of the other factors.

- -

OTHER NON-PARASITIC DISORDERS

With no indication of parasitic fungi or bacteria being responsible, the peculiar behavior of cotton in China may be considered as a disorder or malformation rather than a disease. The plant is not killed, its tissues destroyed, nor even its physiological functions impaired. In this general respect like three disorders studied in ~~all~~ the United States, leaf-out, leaf-curl tissues weakened and growth restricted and abnormal. Does virus continue active in cool weather. Could disease be conveyed in latent form?

- -

Leaf-club or Cyrtosis, a disorder of cotton in China.

A malformation or growth disorder of cotton is widely prevalent in the Yangtze Valley of China, and injurious to foreign varieties as well as the native sorts. Though the plants do not die they may become entirely barren, so that the crop is a failure when the disorder takes a severe form.

In addition to the practical reasons for recognizing the disorder, which is the first step to restricting its distribution, or learning how to avoid injury, several features are of interest in relation to heredity. The affected plants not only survive but continue to grow. Abnormalities of growth are the symptoms of the disorder which present interesting analogies and contrasts with other disorders of cotton that have been studied in the United States.

May be reason for early planting single stalk etc., toget as much crop set as possible early in season . Planting in beds as at Mr. Wu's may also have advantage in getting ground warmer early in season.Best cotton seen thus far.

Cotton Disease in China

#83 Abnormal branching as a symptom of the leaf-club (cyrtosis) disorder in addition to short internodes and distortion of leaves. A short section of the main stalk, split open to show four branches coming from a single node, where only one branch would develop normally. Natural size.
Nanking, China. Oct. 25, 1919.

Cotton Disease in China

#78 Upper portion of diseased plant of Chinese cotton showing somewhat gradual development of the leaf-club disorder, the older large leaves having the tips discolored and somewhat distorted, while the younger, small leaves are closely curled as well as greatly reduced and crumpled. Natural size.
Nanking, China. Oct. 25, 1919.

21769 Branch of Chinese cotton at Nanking, China, showing a relatively mild effect of the leaf-club disorder, with relatively slight distortion of leaves and reduction of petioles and internodes, and retention of flower-buds, to compare with affected branch of Durango Upland cotton shown in plate , and with more extreme cases on Chinese cotton shown in plates to .

21491 Cleveland Big Boll plant with leaf hopper disease. Experiment Station, Wachang, China. Sept. 30, 1919.

21493 Two plants of Russel showing different effects of leaf hopper disease. Wachang, China. Sept. 30, 1919.

21259 Egyptian cotton with leaf-hopper disease. Nanking, China. Aug. 14, 1919.

21306 Lone Star plant with large leaves at bottom and small injured leaves at top (Leaf hopper disease) Nanking, China. Aug. 27, 1919.

21310 Durango plant with leaf hopper disease. Nanking, China. Aug. 27, 1919.

21492 Russel cotton with leaf-hopper disease. Wuchang, China, Sept. 30, 1919.

21304 Durango plant with leaf-hopper disease. Nanking, China, Aug. 27, 1919.

21303 Upland cotton plant with leaves dying showing abnormal branching. Nanking, China, Aug. 27, 1919.

21272 Another plant of same variety in same field with Leaf hopppr injuries. Nanking, China. Aug. 14, 1919.

21331 Plant from patch shown on last photo to show its size. Leaf-hopper injuries just beginning on this plant. Shanghai, China, Aug. 28, 1919.

21481 American Upland plant with open bolls. Paotingfu, China, Sept. 22, 1919.

21302 Small Chinese cotton plant with leaf-hopper disease. Nanking, China. Aug. 27, 1919.

21308 Egyptian plant with leaf-hopper disease. Nanking, China, Aug. 27, 1919.

21301 Upland cotton plant with very advanced stage of leaf-hopper disease. Nanking, China. Aug. 27, 1919.

Cotton Problems in China

COTTON (China) Progress.

Cutting off queues, cessation of foot-binding and prohibition of opium have been taken as endices of prompt reform and progress in China, but queues and foot-binding in full still worn extensively in some provinces. Opium trade and production suspended t temporarily but now reorganized on illicit basis reported rapidly increasing in many districts. Have relation to cotton production only as showing the difficulty encountered in most necessary reforms, as reason for believing that progress is likely to be still slower in constructive efforts unless something more is done than is at present . Experiment stations being established but many years before each or any of these can work out and apply locally developed improvements of varieties or methods. Demonstration stage found necessary in United States not yet recognized in China.

It is being assumed in China that stations would bring about improvement as they have done in many cases in United States but not the lapse of time that has been required even in the United States to adapt the scientific discoveries to practical purposes and sedure their adoption by showing practical advantage to the farmer. # From this standpoint China doubtless most magnificent country in the world. No such body of fertile land in warm temperate regions.

Impression that all the land is used, that production could not be greatly increased is erroneous. Very intensive cultivation, with soil highly fertilized, confined ~~compared~~ to limited regions around cities. Also vast unused resources of labor, unique in quantity and

also in quality, capable and diligent. If properly organized could compete with other parts of world instead of being field of commercial exploitation by sale of manufactured articles. Resources of iron, coal and oil. Greatest manufacturing country as well as producer of raw materials.

Fertile soil, equable climate, and abundant labor would make China the largest producer of cotton, were it not for diseases and pests, especially the latter. A very serious disease or disorder of the cotton plant of general occurrence in China seems to be a consequence of insect injury. It is not possible to estimate definitely the extent to which production is reduced or restricted by this disease, which is not known to exist in America or in other cotton growing regions, and has only now been recognized in China.. But safe to say that in many ~~that~~ experiments complete loss results.

COTTON (Development)

Difficult to judge on account of difference of systems and because rapid changes are now taking place in China. Elements will doubtless be supplied while very rapid development hardly to be expected in field of production, very little doubt that a few years will show serious changes. Note many experiment stations but working without or recognition of practical problems. No question that appreciation of selection would bring valuable results in few years, but doubt of being able to apply.

Cotton (China) Progress(?)

cessation of
cutting off queues ~~and laws against~~ foot-binding
& prohibition of opium have been taken
as evidences of prompt reform & progress in
China but queues still worn extensively
in some provinces & foot binding in full
opium trade & production suspended temporarily
but now ~~rapidly be~~ reorganized on illicit
basis & reports rapidly increasing in many
districts

~~Merely [illegible]~~ ~~mostly [illegible]~~ Have relate to [illegible] product ~~[illegible]~~ only as showing the difficulty encountered in most necessary reforms, ~~[illegible]~~ as reason for belief that ~~[illegible]~~ 'progress is likely to be still slower in constructive efforts unless ~~special~~ something more be done. There is at present perhaps ~~State~~ Expert station very establ[ished] but many years before each or any of these can work out and apply locally developed improvements of varieties or methods. Demonstration stage of [illegible] necessarily in U.S. not yet [illegible]

[illegible]

Cht (China) Progress (2)

It is being assumed in China that stations aimed only at improvement as they have done in many cases in U S but not the lapse of time that has been required even in work in the U. S. to adapt the scientific discoveries to practical purposes and ~~fit them~~ secure their adoption by showing practical advantage to the farmer

China Progress ~~(Resources)~~ (Cotton)

From this standpoint China doubtless most magnificent country in the world. No such body of fertile land in warm temperate regions.

Impression that all the land is used, that production could not be greatly increased is erroneous. Very intensive cultivation, with soil highly fertilized, confined to limited regions around cities. Also vast

unused resources of labor — unique in quantity and also in quality — ~~diligence~~ capable and diligent — If properly organized could compete with other parts of world instead of being ~~exploi~~ field of commercial exploitation ~~with masses~~ by sale of manufactured articles. Resources of iron coal & oil greatest manufacturing cities as well as producing of raw materials.

Cotton (China)

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~~The extent to which this~~
~~disease~~ It is not ~~possible~~ yet
possible to state ~~or even to~~
estimate definitely the extent
to which ~~this disease~~ production
is reduced ~~and~~ or restricted by this
disease, ~~but in many districts the~~
~~crop undoubtedly is~~ which ~~does~~
~~has not~~ is not known to exist
in America or in other cotton
growing regions, and has only now been recognized

in China. But owing to the [illegible] many
districts the apparently complete [illegible]

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~~direct~~ to [illegible] with
[illegible] by recognition
of practical problems. No
question that [illegible] of selection
[illegible] by probable results in
few years, but [illegible] to be able
to apply

COTTON (China)

Behavior of American Varieties in China.

As usually happens with such experiments, many of the plantings were not made under regular field conditions. Some were in rich garden soil with plenty of moisture and surrounded by walls that shut off the wind and retained the atmospheric humidity. The result in extreme cases was that the plants grew very large and luxuriant and produced very little cotton, as usually happens under conditions of rank growth in the United States.

In cases where growth was not so excessive as to interfere with production, bolls might be set in sufficient numbers but fail to produce a satisfactory crop on account of maturing too late or being injured by pests or diseases, including the mildewing of partly open bolls in damp or rainy weather

Large Bolls Less Important in China.

No doubt the very small bolls of the Chinese cotton are one of the chief reasons why this type has appeared so inferior to our American Upland varieties. From the standpoint of cotton-growing in the United States the small bolls of the Chinese cotton must seem very undesirable on account of requiring more labor in picking, which is a very important consideration in the United States. In China, however, labor is less expensive and there are certain advantages attaching to the small bolls that the Chinese farmer does not leave out of account.

Cotton (China)

Behavior of American Upland Varieties in China.

~~many plantings not~~

As usually happens with ~~such~~ such experiments, many of the plantings were not made under regular field conditions. Some were in rich garden soil ~~protected by walls that~~ with plenty of moisture and ~~protected by walls that shut off~~ surrounded by walls ~~that protected~~ helped to retain the atmosphere ~~which~~ shut off the wind and retained the atmospheric humidity. ~~The~~ The result in ~~these such~~ cases was that the plants grew very large

and even became luxuriant and produced
very little cotton, as often happen usually happens
under similar conditions of rank growth in the
United States. In cases where If the growth was not so too excessive
Other experiments were to the point of ... as to
interfere with production large numbers of good crops of
bolls were set but still the yield was not good
the crop failed to bolls might be were set in sufficient
numbers but fail to develop mature properly,
owing produce a satisfactory crop on
account of failure of mature to late ripening injuries of pests or insects
late mature maturing too late,
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in during rainy or damp or rainy weather

Cotton (China)

Large Bolls less important in China

No doubt the very small bolls of the Chinese cotton are one of the chief reasons why this type has appeared so inferior to our American Upland varieties. From the standpoint of missionaries or travellers. Probably some travels

~~From our point of view the use~~
~~Other things being equal, the~~ ~~that the~~ small
~~bolls are a disadvantage.~~ ~~It should~~
~~To anybody who is familiar.~~ ~~To any American~~
From the standpoint of cotton-growing in America the
United States ~~large to small~~ the small bolls of the
Chinese cotton must ~~appear as~~ seem very ~~undesirable~~ ~~a great disadvantage~~
on account of their requiring more labor in picking,
~~and thus on~~ which is a very important consideration
in the United States, ~~but there~~ In China, however, ~~there~~
~~or where labor is a~~ labor is less expensive and
there are certain advantages attached to the small bolls ~~[illegible] several small bolls~~
~~there are several compensating~~ leave out of account [illegible]
the Chinese farmer does not ~~have several [illegible] advantages that~~
~~largely compensate for the labor~~ [illegible] need [illegible]
[illegible] into account [illegible]

COTTON (China) Manufacturing.

Development of Chinese cotton manufacturing is going forward entirely on the basis of short fiber goods. Other branches are not likely to be attempted until this field is well occupied and the need of developing other lines is felt. Fine spinning would require different machinery and more skilful operatives. Policy of free selling and cotton machinery may be taken to mean that British expect to go over to finer spinning, which will require more long staple, and is natural explanation of the more acute interest in long staples in recent years, even before the war period disturbed all the industrial relations.

See what opinions were expressed at recent Cotton Congress in New Orleans.

Cotton (Chinese) Manufactory (1)

Development of chinese cotton mfg is going forward entirely on the basis of short ~~cotton~~ fiber goods. ~~Not likely to be~~ Other branches are not likely to be attempted until this field is well occupied and the need of developing other

lines is felt. Fine
spinning would require different
machinery and ~~better~~ ~~too~~
more ~~[illegible]~~ skilful operatives -
~~Opponents among~~
~~who~~ ~~[illegible]~~ ~~not~~ ~~like~~ - Opponents of
~~[illegible] of selly cotton machinery but~~
~~this gone by. But~~ Free ~~sale~~ of
~~cotton mach~~ - Policy of free selling
of cotton machinery ~~[illegible]~~ may

Cotton (China) Manufr (2)
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which will require longer more
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all the industrial relations (over)

See what opinions were
expressed at recent Potter
Congress in New Orleans -