Luffa ægyptiaca, is a wild variety and is commonly found growing along hedges, and is fairly drought resistant. The object of this cross was to introduce the hardiness and drought resistant characters of the wild variety into the cultivated one. The main differences between the two species are given below:

	L. acutangula.	*L. ægyptiaca.*
Leaf	Faintly five lobed	Deeply five lobed
Flower	Opens between 5 and 6 P. M.	Opens between 4 and 5 P. M.
Fruit	Oblong clavate with 10 sharp angles	Large, cylindric and smooth
Seed	Not winged, slightly rugose on the sides	Narrowly winged, smooth on sides

Both the reciprocal crosses were successful, and the setting of seeds was fairly large. The F_1 characters were all intermediate especially as regards the more striking of the characters as observed in leaf shape, flower opening (opens between 10 and 11 P. M.), nature of seed coat, and the shape of the fruit. The F_1 plant put on vegetative growth for a period of about one year from sowing; during this period it had one flush of fruiting during the months of February to May, standing the hot weather conditions remarkably well; after the hot weather and with the commencement of the monsoons it again gave a second flush of fruiting.

The germination of F_1 seeds was very poor and therefore a few plants (about ½ dozen) only could be studied. The few plants that were examined were intermediate in all the characters. The production of pistillate flowers was also very few.

An intervarietal cross was attempted between *Luffa acutangula* and *Luffa acutangula*, var., *amara*. The latter is a wild variety while the former is the cultivated one. The wild variety is exactly like the cultivated one, excepting that the fruit is very much smaller (3 inches long and about ½ inch thick), and the leaves, flowers, etc., are comparatively smaller than *L. acutangula*. In this case the cross between *L. acutangula* (female) and *L. acutangula*, var., amara., (male) was successful while the reciprocal did not fertilize.

The fruit of the F_1 was intermediate in shape; and the F_2 seeds did not germinate for further studies.

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Agricultural Jottings

BY THE DEPARTMENT OF AGRICULTURE, MADRAS

I. An Improved Water-Lift for Short Lifts. An improved water-lift of the circular mhote type has been designed by the Agricultural Department and subjected to a long period of trial with very satisfactory results. It is an improvement on the well known circular mhote so extensively employed in the South Arcot district.

The lift employs two cylindrical buckets which rise and fall, the one ascending full of water whilst the empty one descends. A large hinged flap valve in the bottom of each bucket allows the buckets to submerge and fill as they are lowered into the water at the ends of their supporting chains. Each bucket is hung in an inverted 'U' shaped yoke which is hingedly attached to projecting pins on the

sides of the bucket a little above the level of the centre of gravity and which permits the bucket to tip into a horizontal position when it is raised to the point of discharge. A hinged link or ring on the front of the bucket near the top is loosely coupled to a stout iron rod which is hung down the wall of the well from a cross beam at the level of discharge and causes the bucket to tip and discharge when it comes in contact with the bend or stop at the top of the rod.

The chains which support the buckets pass over head pulleys which are mounted on a frame directly over the buckets and then diverge horizontally to sheave blocks which are mounted on posts situated diametrically opposite to each other at the edge of the circular bullock track and in a line parallel to the side of the well. After passing through these sheave blocks the chains are brought together to their common terminus on the rotating beam. The sheave blocks are mounted about 7 ft. high on the posts to support the chains with sufficient clearance above the animals' horns.

The rotating beam is self-supported on a central post. The pair of animals are hitched to one end of the beam at about 12 ft. from the centre of rotation and the two chains are connected to a swivelling block which may be attached to the other end of the beam at various distances from the centre of rotation according to the depth of water level in the well or the height through which the water must be lifted. If, for instance, the chains are attached at a distance of 6 ft. from the centre of rotation, the up and down movement of the buckets, produced by the rotation of the beam, will be 12 ft. or very nearly so. After the chains are connected to the beam at such a distance from the centre of rotation and the length of the chains is so adjusted where they attach to the beam, that the buckets will be lowered well below the surface of the water and will be raised exactly to the tipping or discharge position, no further adjustment is required unless of course there is any considerable change in the water level due, for instance, to a fall in the water table in the dry season or a rise in a wet one.

Both buckets are raised full of water and discharged during each rotation of the beam. The capacity of the buckets normally employed is 16 gallons so that 32 gallons of water are discharged per rotation of the beam. A pair of average sized cattle will average 2½ circuits of the circular track per minute, so that 4,800 gallons are discharged per hour. This is the normal output of the lift when provided with the usual 16 gallon buckets and lifting from depths up to 10 ft. or so. With better cattle 20 gallon buckets may be fitted to give an output of 6,000 gallons per hour. One of these improved lifts with 16-gallon buckets on the Agricultural Research Station, Palur, near Nellikuppam, raising 4,800 gallons per hour, is worked by a single Ongole bull.

The draught, of course, is not uniform but varies from zero to a maximum of about 145 lbs. and back to zero twice during each rotation of the beam. The weight of the strong 16-gallon bucket with all fittings is 58 lbs.

The lift is designed only for short lifts up to about 12 ft. and is therefore only applicable to those districts where high water tables prevail. It could be adapted for somewhat greater depths but not with the same convenience and advantage. It shares this inherent disadvantage with the original South Arcot design of circular mhote but in comparison with the latter it is very much simpler and neater in design and considerably more efficient giving a 45% greater output with the same capacity buckets and the same sized cattle. The cost is considerably less.

This improved design should make a strong appeal to the ryot and it is hoped that demonstration of the lift will lead him to adopt it in preference to the present crude design which in spite of its low efficiency has attained such a popularity in the South Arcot and neighbouring districts.

II. **Active Carbon and Its use.** The industry of jaggery making, though practised in India from very early times, has till now made little progress as regards its technique. The old primitive method of concentrating the juice in open pans over direct fire is still in vogue and no attempt is made at clarification of the juice except uncontrolled liming. The result has been that the jaggery so produced is dark in colour, unclean and of poor quality and therefore fetches only a low price in the market.

2. Nevertheless, the bulk of the cane grown in India (roughly two thirds of the total output) is converted into this crude form of sugar only, for which there is normally a ready demand in the country itself. In recent years, however, there has been a growing demand for white sugar from the well-to-do and educated middle classes and this increasing demand is being met partly by importation from abroad and partly from the rapidly growing local white sugar industry. Despite this rapid development of the latter, jaggery making will continue to maintain its important place in the economy of the Indian ryot as a cottage industry for several years to come, as a large portion of the cane area is bound to be scattered and out of reach of sugar factories. It became therefore an urgent necessity to devise suitable measures for the rehabilitation of the jaggery industry, one of the obvious means being to improve the quality of the jaggery by cheap methods so that it may sell at a higher rate in the market.

3. It is well known that bone charcoal and more recently active carbons of vegetable origin are in general use in refineries for the production of white sugar. Their prohibitive cost (viz. 8 to 10 as. a lb.), however, militates against their economic use for improving the jaggery making process.

4. Investigations were therefore started in the laboratory of the Government Agricultural Chemist, Coimbatore, in 1932 to prepare active carbons from readily available waste materials like paddy husk, groundnut husk, saw dust etc. These efforts were attended with a great measure of success and large quantities of active carbon were produced from paddy husk at the comparatively low cost of about 2 annas per pound.

5. The method of preparation is simple and merely consists in treating the paddy husk char with caustic alkali and removing the alkali by washing with water.

6. The carbon so prepared becomes light and very porous in structure and by virtue of this fact it is able to remove colouring matter and other organic substances from solutions. Thus on treating sugarcane juice with the active carbon, the juice is not only decolourised completely, but also clarified and sterilised to a certain extent.

7. The new process of jaggery making is extremely simple and does not involve any complicated operations or elaborate machinery. The cane juice is raised to the boiling point and then passed through a bed of activated carbon contained in a conical cylinder with a perforated bottom. The juice comes out through the filter colourless and brilliant and is boiled down to jaggery, whole sugar or rab in the ordinary way. The products thus obtained are strikingly superior in colour and quality to those prepared by the local method and are also extremely clean.

8. For the past three seasons, the Department has been conducting demonstrations of the improved process in almost all the important cane growing districts of the Presidency. Except in a very few places, the products have been so good as to arouse the enthusiasm of the most conservative of the ryot with the result that there arose a very great demand for this carbon from ryots all over the Presidency. As it is impossible to meet this demand for obvious

reasons, it was decided to give practical training in carbon making to a number of departmental demonstrators and to as many private individuals as desired this training. As a result, it has been possible to start carbon making this season, in the Agricultural Research Stations at Anakapalle (Vizagapatam) and Palur (South Arcot). A few enterprising and enthusiastic ryots have taken advantage of this training and have also been preparing carbon for their own use.

9. The cost of producing one pound of active carbon from paddy husk roughly works out to 0—1—9 ps. and it has been found that carbon once used can be reactivated at least twice again by strong heating only. The reactivation thus costs very little and it appears therefore certain that the carbon process will not be economically unsound provided arrangements are made for reactivating the used carbon for further use.

10. Paddy husk carbon can also be profitably used for preparing white sugar under the open pan system of boiling. The quality is much better and the yield of sugar or rab is much more than is obtained without charcoal treatment, and one sugar factory has made enquiries about its use for white sugar making.

11. Palmyrah and coconut palm juices have also been found to respond well to charcoal treatment. There is a striking improvement in the colour and quality of the sugar and jaggery obtained from these juices as a result of carbon treatment. The characteristic palmyrah odour usually present in these products is entirely removed.

12. Yet another use to which paddy husk carbon has been put is for the clarification of oils. Cocoanut oil becomes colourless and brilliant on filtration through this carbon. Castor oil is deprived of almost all of its repulsive odour and Gingelly and Groundnut oils become considerably lighter and purer after carbon treatment.

ABSTRACTS

Resistance of Sorghum to stem borers. It was noticed from field tests that the extent of infestation by stem borers in Sorghum varies with varieties. The results obtained under controlled conditions would appear to show that the host selection of moths is one of the causes of the phenomenon. There has been observed a significant association between infestation and height of plants which may be explained by the assumption that tall plants present more space to the borers attacks than the short and dwarf plants. With a large number of grain colours present in sorghums, white grain varieties have shown comparatively less infestation by borers than varieties with other grain colours. Under controlled conditions 'sorgos' as a group were more susceptible to the attack than the nonsaccharine varieties. (*Amer. Sci. Agronom*, Vol. 28, No. 4, pp. 271–278). K. R.

An Electrical Remedy for Tree Borers. The writer recently rigged up a magneto as an amusement device for a pair of growing youngsters, with which they could give mild shocks to themselves and other youngsters of the neighbourhood. Later, having heard of the method of driving earth-worms out of the ground by electric current, the magneto was turned to this use. When a pair of steel rods wired to the magneto were thrust into wet ground about six inches apart and the crank turned, the earth-worms came crawling out. Still later, when the writer was engaged in the laborious task of digging elm-borers out of a tree with a pocket knife, the idea came of turning the magneto to use for this job. When two nails were driven into the bark a few inches apart in the affected area, the nails attached to the magneto and the crank turned, the elm-borers came out in a few seconds. Subsequent digging in the electrically treated bark proved that the borers had vacated 100 per cent.