

The reversion from citrate soluble phosphoric acid to citrate insoluble phosphoric acid took place slowly. Hence it was not considered a problem under the conditions prevailing during storage. Though the water-soluble phosphoric acid was reduced during the period of storage, the available from of phosphoric acid was not affected much, since the citrate soluble phosphoric acid increased proportionally and the mixture satisfied the guaranteed percentage of available phosphoric acid. Among the different particle sizes of the white clay, the 1 mm particle-size white clay was found to be the best filler than the rest as the absorption of moisture and the reversion of water-soluble phosphoric acid thereof was minimum in the mixture carrying the above filler.

It is therefore concluded that the white clay passing through 1 mm sieve can be used as a filler to the extent of 34% in the manure mixture, 16:4:4. The quality of the manure mixture can further be improved by adding ammonium sulphate and by reducing the proportion of the urea in the manure mixture.

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Effect of Bacterial Inoculation for Pulses Cultivated in Tamil Nadu

Fixation of atmospheric N in root nodules in the leguminous plants is an established fact. But the quantity of nodules found in the roots of the plants of the same crop, grown in different soils situated not far off from one another varies. This variation is attributed to the presence or absence of the proper N fixing bacteria in the various soils in sufficient quantities. To ensure the presence of proper N fixing bacteria and thereby to augment the fixation of N and inturn to get maximum yield, artificial inoculation of bacteria is resorted to. To find out the effect of artificial inoculation of bacteria on pulses cultivated in Tamil Nadu, experiments were conducted at the Pulses Section.

Jenkins *et al.* (1954) observed that bacterial inoculation of legumes was quite necessary for their proper establishment, when grown in new place.

Beneficial effects of inoculation of different legumes with appropriate bacteria have been observed by Rajagopalan (1938), Madhok (1941), Abdel and Erdman (1964), Johnson *et al.* (1965), Ramaswamy and Nair (1965).

Desai (1951) observed that bacterial inoculation was necessary for growing legumes in eroded lands and even indigenous legumes require replenishment of the requisite organisms. Duggar (1935) reported that artificial inoculation of unhulled pea nut seeds (*Arachis hypogea*) increased the number and proportion of large nodules (upto 40%) and the yield (upto 30%). Rajagopalan *et al.* (1965) reported significant increase in yield due to bacterial inoculation in greengram (*Phaseolus aureus*).

Experiments were conducted at the Pulses Section, Agricultural College and Research Institute, Coimbatore, for a period of three years commencing from 1963-64, with redgram (*Cajanus cajan*), blackgram (*Phaseolus mungo*), greengram (*P. aureus*), bengalgram (*Cicer arietinum*), horsegram (*Dolichos biflorus*) and cowpea (*Vigna sinensis*) using *Rhizobium* culture. The crops were raised under rainfed condition with protective irrigation. The design of the experiment was randomised replicated one with twelve replications and two treatments — inoculated and uninoculated. In bengalgram, the yield data recorded during 1963-64 were unreliable due to unfavourable seasonal conditions and no data could be recorded during 1965-66 due to damage by root mealy bugs. The yield particulars were recorded during these three years in respect of all these crops.

TABLE. Yield of pulses (as percentage on control)

Particulars	Year			Mean
	1963-64	1964-65	1965-66	
1. Redgram				
Inoculated	150.8	96.8	107.2	107.6
Uninoculated	100.0	100.0	100.0	100.0
S.E.	8.4	3.3	7.2	6.2
C.D.	26.3	—	—	—
2. Blackgram				
Inoculated	107.0	85.2	118.5	100.0
Uninoculated	100.0	100.0	100.0	100.0
S.E.	4.0	5.0	7.0	5.3
3. Greengram				
Inoculated	99.0	88.7	107.8	96.2
Uninoculated	100.0	100.0	100.0	100.0
S.E.	3.4	4.4	4.3	4.1
4. Bengalgram				
Inoculated	—	91.3	—	91.3
Uninoculated	—	100.0	—	100.0
S.E.	—	7.7	—	7.7

The interval of irrigation had no effect in the suppression of the weeds. The minor treatments significantly differed in their effect on the suppression of both the type of grasses which are the menace in this tract. The trash mulching with and without the final incorporation was significantly more effective in suppressing both the types of grass than "no trash mulch" (control). The interaction between irrigation interval and cultural practices did not prove significant meaning thereby that the effect of trash mulching is unaffected by the interval of irrigation. The higher percentage of weed control in 16 days irrigation may be due to drought condition.

Trash mulching has proved significantly effective in suppressing weed growth whether the mulch is removed or turned in after 150 days. Over 66% of grassy weeds like *nutgrass* and *hariali* were suppressed by trash mulching. The better effect of trash mulching in suppressing the weed growth inspite of higher moisture regime can be explained by not having sufficient aeration and sunlight in those plots which are essential for the growth of weeds. This result confirms the findings of Halliday (1956), Parthasarathy (1957), Mathur (1960), Shri Khande and Verma (1959) and other Sugarcane Research Stations in Tamil Nadu.

Effect of irrigation cum trash mulch on sugarcane yield: The plotwise cane yield data were statistically analysed for both the years. The results are presented in Table 2. Irrigation at shorter intervals namely once in eight days produced significantly increased cane yield of about eight tonnes/acre than the longer interval of irrigation, namely, once in 16 days. Trash mulching with or without incorporation with irrigation once in eight days increased the yield of cane by nearly 20 tonnes/acre over "no trash mulch with irrigation once in 16 days". Trash mulching either incorporated or removed has produced an increased yield of 12 tonnes/acre over "no trash mulch". The interaction effect was not significant, *i. e.*, the response of trash mulching was independent of irrigation.

The yield of cane significantly increased with irrigation at shorter intervals. The soil being loose and porous, frequent irrigations are necessary to keep the soil in field capacity. During summer months the temperature goes up even as high as 105° F. Consequently, irrigations are necessary at shorter intervals rather than longer intervals as once in 16 days.

Trash mulching with or without incorporation had significantly increased the yield over "no trash mulch". The response to trash mulching is independent of the frequency of irrigation. Hence both trash mulch and irrigation at shorter intervals are required to conserve proper soil moisture for better sugarcane growth especially during the grand growth period of the crop and control grassy weeds in this tract. The better effects of trash with shorter interval of

irrigation on yield was mainly due to its effect of increased population, length and weight of millable cane.

TABLE 2. *Results of statistical analysis of yield data from irrigation-cum-trash mulch experiment conducted at Sugarcane Zonal Farm, Rajathanikottai during 1962-64*

Yield per year Treatments and results	Yield in tonnes per acre		
	1962-63	1963-64	Mean for sub-treatment
A. Irrigation once in 8 days			
a) Control	17.35	22.25	19.80
b) Trash mulch and removed	26.06	39.83	32.95
c) Trash mulch and incorporated	25.68	39.96	32.82
Mean for irrigation	23.03	34.01	28.52
B. Irrigation once in 16 days			
a) Control	12.00	14.76	13.38
b) Trash mulch and removed	22.17	25.62	23.90
c) Trash mulch and incorporated	19.95	26.01	22.98
Mean for irrigation	18.04	22.13	20.09
F test for main treatment	Significant	Significant	
F test for minor treatment	Significant	Significant	
F test for interaction	Not significant	Not significant	
S.E. for irrigation	1.66	1.46	
S.E. for sub-treatments	2.71	1.17	
S.E. for interaction	1.21	1.32	
C.D. for irrigation	4.29	5.88	
C.D. for sub-treatments	5.66	3.32	
<i>Mean for sub-treatment</i>			
a) Control	14.68	18.50	16.59
b) Trash mulch and removed	24.12	32.73	28.43
c) Trash mulch and incorporated	22.82	32.99	27.91
Conclusion			
Main treatment	A B	A B	
Sub-treatment	b c a c b a		

In sandy loam type of soil which are subjected to severe drought, shorter interval of irrigation viz., once in 8 days gives a net profit of Rs. 300/- per acre over longer interval of irrigations viz., once in 16 days. Trash mulching with or without incorporation gives a net profit of Rs. 500/- per acre over no trash mulch. Combined effect of trash mulching and irrigation at shorter interval gives a net increased profit of Rs. 750/- per acre (Vide Table 3).

TABLE 3. *Economics*

Treatments	Yield (tonnes/ acre)	Cost of produce (Rs./acre)	Cost of production (Rs./acre)	Net profit (Rs./acre)
A. Irrigation at 8 days interval				
a) No trash mulch	19.8	1061	859	202
b) Trash mulch and removed	33.0	1769	980	789
c) Trash mulch incorporated	32.8	1758	973	785
mean for irrigation	28.5	1529	937	592
B. Irrigation once in 16 days				
a) No trash mulch	13.4	719	694	25
b) Trash mulch and removed	23.9	1281	793	488
c) Trash mulch and incorporated	23.0	1233	781	452
Mean for irrigation	20.1	1078	756	322
Mean for sub-treatment				
a) No trash mulch	16.6	890	777	114
b) Trash mulch and removed	28.5	1525	887	639
c) Trash mulch and incorporated	27.9	1496	877	619

The following conclusions are drawn. (1) Irrigation once in 8 days has a significantly better cane yield by about 8 tonnes per acre than 16 days irrigation. (2) Trash mulching alone or incorporated into soil is definitely more advantageous in increasing the yield over "no trash mulching (control)" by 12 tonnes/acre. (3) The combined effect of trash mulching and irrigation at shorter interval of 8 days resulted in a high increased yield of 20 tonnes per acre. (4) Economically irrigating once in 8 days gives a net profit of Rs. 300/- per acre, over long interval of 16 days. (5) Application of trash mulch either incorporated or removed on the 150th day has given a net profit of Rs. 500/- per acre over "no trash mulching". (6) Combined effect of trash mulching and irrigation at shorter interval has given a net increased profit of Rs. 750/- per acre. (7) Trash mulch either incorporated or removed after 150 days significantly proved better in controlling grassy weeds like *nutgrass* and *hariali* than "no trash mulch".

For the sandy loam type of soil prevailing in this tract, shorter interval of irrigation with trash mulching has not only proved effective in suppressing the grassy weeds which are a menace but also greatly increased the yield of cane per acre.

The financial help rendered by the Indian Central Sugarcane Committee, New Delhi and Madurai Sugars and Allied Products Limited, Pandiarajapuram Madurai district is gratefully acknowledged.

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Sterility in an Inter-Varietal Hybrid, *Solanum melongena* L. × *S. melongena* var. *bulsarensis* Argikar

S. melongena var. *bulsarensis*, a wild variety of the eggplant reported by Argikar (1952), was morphologically distinct from the cultivars. It was a glabrous annual, with leaves resembling somewhat those of tobacco (Fig. 1). The fruit was spherical, purple coloured, with a leafy elongated calyx and thick cracking pericarp. It was edible, but with peculiar flavour. With a view to study its nature of affinity with the cultivars, it was crossed with 'Manjirigota', a prickly variety of *S. melongena* common in Maharashtra State (Fig. 2). The cross could be easily effected with the cultivar as female parent; the reciprocal cross completely failed. The F_1 hybrid was prickly, shrub-like, and perennial (Fig. 3). It was quite robust, exhibiting hybrid vigour in respect of plant height, branching and size of leaf and flower. It produced small parthenocarpic fruits in abundance. Selfing as well as back crossing to both the parents failed to bring about seed set. Ninety percent of the pollen was aborted and shrivelled.

The chromosome number was 24 (2n) in the parents and the hybrid. Meiotic studies on parents revealed no abnormalities. In the hybrid, normal pairing into 12 bivalents occurred in only 31.5% cells at MI. The configuration of 10 bivalents and a quadrivalent was more common, having been observed in 38.3% cells. In rest of the cells, 2 to 4I were noticed in addition to the bivalents. The anaphase separation was abnormal with chromatid bridge in almost all the cells. Megasporogenesis and embryo sac development were normal in the parents, as described by Bhaduri (1932) for *S. melongena*. In the hybrid, early breakdown of these processes was observed. Degeneration, commencing with the megaspore mother cells, continued in tetrads and functioning megaspores in an increasing manner. Almost all the functioning megaspores remained defunct and atrophied, without forming the embryo sacs. Consequently, at the time of anthesis, the ovules were only sterile and compact tissues, devoid of embryo sacs (Fig. 5).