The reduction in density of total weeds observed in Pretilachlor 750 g ha^{-1} and Oxadiargyl 100 g ha^{-1} applied plots under conservation tillage, controlled their dry weight and subsequently curtailed nitrogen, phosphorus and potassium nutrients removal by weeds (Table 3). It was earlier reported by Malik *et al.* (1973).

Rice grain yield data showed that, Pretilachlor and Oxadiargyl applied under conservation tillage system recorded considerable increase in rice grain yield (Table 4).

Next best treatments were hand weeding twice and Butachlor 1250 g ha^{-1}, which recorded higher grain yield than unweeded control.

From the results of this study, it is clear that due to the impact of conservation tillage, the density of weeds after rice sowing was effectively curtailed, which leads to lesser nutrient removal and higher grain yield. This was earlier confirmed by Tewari and Singh (1991) and Balasubramanian (1997). The significant effect of pre-emergence herbicides *viz.* Pretilachlor 750 g ha^{-1} and Oxadiargyl 100 g ha^{-1} at 4 DAS contributed lesser weeds problem after sowing of rice. This finding was in accordance with the results of Smith and Moody (1979). Therefore, in terms of weed control and higher grain yield, application of Pretilachlor 750 g ha^{-1} (or) Oxadiargyl 100 g ha^{-1} at 4 DAS under conservation tillage system might be considered as an effective weed management practice for wet-seeded rice.

References

Balasubramanian, R. 1997. Effect of Glyphosate and pre-emergence herbicides in weed control of rice. *Journal of pestology.* XXI: 52-54.

Bartlett, KS. 1947. The Use of transformation, *Biometrics.* **3:** 1-2.

Biswas, J.C. Sattar, S.A. and Siddique, S.B. 1991. Evaluation of herbicides in direct-seeded rice. *Bangladesh Rice J.* **2:** 40-43.

Gomez,K.A. and Gomez, A.A. 1984. Statistical procedure for agricultural research. John Wiley and Sons. New York. pp. 680.

Klingman, G.C., Ashton, F.M. and Noordhoff, L.J. 1982. Weed Science - Principles and Practices, 2nd edition. Wiley Inter - Science Publication. pp. 134-135.

Malik, A.S., Kumar, V. and Moolani, M.K. 1973. Dryland research in North-west India. In: Effect of variable pre-planting tillage on soil moisture, growth and yield of pearlmillet. *Agron. J,* **65:** 12-14.

Pillai, K.G. 1977. Integrated Weed Management in rice. *Indian Farming,* **26:** 17-23.

Smith, R.J. Jr. and Moody, K. 1979. Weed control practices in rice. In: Kammedahl, T. (ed.) Integrated Plant protection for Agricultural crops and Forest Trees. *Proc. Symp. 9th Int. Cong. Plant Prot.* 2, Washington D.C. pp. 458-462.

Tewari, A.N. and Singh, R.D. 1991. Studies on *Cyperus rotundus* L. control through summer treatments in a maize-potato cropping system. *Indian J. Weed Sci.,* **23:**6-12.

Venkateshwarlu, B. 1980. Relative crop efficiency of transplanted and direct sown rice under wet condition. *Indian Farming.* **2:** 3-61

(Received : May 2001; Revised : September 2001)

Madras Agric. J. 88 (10-12) : 593-596 October-December 2001
https://doi.org/10.29321/MAJ.10.A00380

Effect of Iron and Zinc fertilization on yield, quality and their availability in Sugarcane

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Abstract : Field experiments were conducted on plant and its ratoon crop of sugarcane (Co.Si.96071) during 1998-99 and 1999-2000 in a clay loam marginally-saline alkaline soil. The results on cane yield and quality parameters showed that foliar spray of ferrous sulphate (1%)+zinc sulphate (0.5%) at 45 and 90 days after planting along with basal application of pressmud (5t ha^{-1}) increased the cane yield and sugar yield significantly over soil application of $FeSO_4$ and $ZnSO_4$ and control treatments. Application of pressmud enriched with $FeSO_4$ and $ZnSO_4$ increased the cane yield, commercial cane sugar content and sugar yield over soil application of state micro nutrient mixture. Enriched pressmud with micro nutrients also improved the availability of DTPA extractable iron and zinc in soil. *(Key words : Iron and zinc enriched pressmud, foliar spray, cane yield and sugar yield, DTPA extractable micro nutrients)*

The wide spread occurrence of micro nutrients deficiency in multiple cropping with improved varieties along with continuous application of higher doses of chemical fertilizers is becoming an increasing problem. It is more true in saline and alkaline soils where availability of micro nutrients is very less. In some areas multiple deficiencies of micronutrients are common which required application of more than one micro nutrient. Micronutrients take part in the oxidation reduction processes of the plants and in the production of sucrose, hence these elements are considered of prime importance along with NPK fertilizers. Jayabal *et al.* (1991) reported that application of $ZnSO_4$ @ 40 kg ha^{-1} or boron 5 kg ha^{-1} through soil along with recommended dose of NPK fertilizers increased the cane yield and sugar yield significantly with an improvement in the quality of juice. Enrichment of pressmud with micro nutrients will increase the micro nutrient use efficiency. Keeping these in view, the investigation was carried out to study the influence of different modes of application of micro nutrients in sugarcane.

Materials and Methods

Field experiments were conducted at Sugarcane Research Station, Sirugamani farm on plant (1998-99) and ratoon crop (1999-2000) of sugarcane variety Co.Si.96071 in a clay loam marginally-saline alkaline soil (pH 8.47, EC 2.21 dSm^{-1}, alkaline permanganate-N 190.9 Kg ha^{-1}, Olsen-P 17.O Kg ha^{-1}, NH_4OAC-K 290 Kg ha^{-1}, DTPA extractable iron 13.7ppm and zinc 1.5ppm. The experiments was laid out in spilt plot design comprising of two main plot treatments (No pressmod and pressmud-5t ha^{-1}) and nine sub plot treatments (Control $ZnSO_4$ 37.5 Kg ha^{-1}, Zn enriched pressmud 18.75 Kg ha^{-1}, Fe enriched pressmud 50Kg ha^{-1}, $ZnSO_4$ @ 37.5Kg ha^{-1} + $FeSO_4$ @ 100Kg ha^{-1}, Zn enriched pressmud +Fe enriched pressmud, foliar spray of $ZnSO_4$ (0.5%)+$FeSO_4$ (1%) at 45 and 90 days after planting and state micro nutrient mixture with three replications. 18.75Kg $ZnSO_4$ ha^{-1} and 50 Kg $FeSO_4$ ha^{-1} was mixed with pressmud @ 5t ha^{-1} separately, moistened and incubated for 30 days. The NPK fertilizers were applied uniformly to all the treatments at the recommended level of 275:62.5:112.5Kg N,P_2O_5, and K_2O ha^{-1} in the form of urea, single super phosphate and muriate of potash. The crop was grown and harvested at the age of 12 months. Cane juice samples at harvest stage were drawn and analysed for quality parameters. Cane yield was recorded and

Table 1. Effect of pressmud and micro nutrient application on yield, quality and CB ratio (I plant crop)

Treatments	Cane yield (t ha^{-1})			CCS (%)			Sugar yield (t ha^{-1})			CB ratio	
	NoP	P (5t ha^{-1})	Mean	NoP	P (5t ha^{-1})	Mean	NoP	P (5t ha^{-1})	Mean	NoPP	(5t ha^{-1})
1. Control	100.6	109.6	105.1	9.1	9.8	9.5	9.2	10.0	9.6	-	-
2. $FeSO_4$ (100 kg ha^{-1})	111.2	119.7	115.5	10.0	10.1	10.0	11.1	12.1	11.6	1:2.38	1:2.35
3. $ZnSO_4$ (37.5 kg ha^{-1})	106.5	115.0	110.8	10.4	10.6	10.5	11.1	12.2	11.6	1:2.28	1:2.57
4. ZnEP (7.5 t ha^{-1})	111.5	120.0	115.8	10.3	10.4	10.3	11.5	13.8	12.6	1:2.38	1:2.46
5. FeEP (7.5 t ha^{-1})	119.2	127.6	123.4	10.9	11.0	10.8	13.0	14.0	13.5	1:2.55	1:2.57
6. T2+T3	120.2	128.6	124.4	10.0	10.2	10.1	12.0	13.1	12.6	1:2.57	1:2.73
7. T4+T5	122.7	131.0	126.9	10.9	11.0	11.0	13.4	14.4	13.9	1:2.63	1:2.81
8. Foliar spray*	131.8	140.7	136.3	11.0	11.2	11.1	14.5	15.8	15.1	1:2.82	1:3.02
9. State MN mixture	123.3	132.0	127.7	10.8	10.9	10.9	13.3	14.4	13.9	1:2.64	1:2.83
Mean	116.3	124.9	-	10.4	10.5	-	12.1	13.8	-		
	M	S	M@S	M	S	M@S	M	S	M@S		
CD (P=0.05)	3.04	4.12	9.12	NS	NS	NS	0.27	0.46	0.80		

Table 2. Effect of pressmud and micro nutrient application on DTPA extractable iron status in soil (ppm)

Treatments	I Plant Crop			Ratoon crop			II Plant crop		
	NoP	P (5t ha^{-1})	Mean	Nop	P (5t ha^{-1})	Mean	NoP	P (5t ha^{-1})	Mean
1. Control	9.65	11.8	10.7	8.64	10.7	9.67	9.86	12.1	11.0
2. $FeSO_4$ (100 kg ha^{-1})	9.66	11.7	10.7	8.65	10.7	9.68	9.87	12.6	11.2
3. $ZnSO_4$ (37.5 kg ha^{-1})	10.2	11.7	11.0	9.19	10.7	10.7	10.3	12.3	11.3
4. ZnEP (7.5 t ha^{-1})	11.4	12.9	12.2	10.4	11.9	11.2	11.6	13.2	12.4
5. FeEP (7.5 t ha^{-1})	15.3	16.8	16.1	14.3	15.8	15.1	15.6	17.1	16.4
6. T2+T3	11.0	12.5	11.8	9.99	11.5	10.7	11.2	12.8	12.0
7. T4+T5	16.2	17.7	17.0	15.2	16.7	16.0	16.4	18.0	17.2
8. Foliar spray*	9.71	11.2	10.5	8.70	10.2	9.45	9.93	12.5	11.2
9. State MN mixture	11.2	12.7	12.0	10.2	11.0	10.6	11.6	13.0	12.3
Mean	11.6	13.2	-	10.6	12.1	-	11.8	13.6	-
	M	S	M@S	M	S	M@S	M	S	M@S
CD (P=0.05)	0.32	0.53	0.97	0.28	0.49	0.96	0.30	0.49	0.84

Table 3. Effect of pressmud and micro nutrient application on DTPA extractable zinc status in soil (ppm)

Treatments	I Plant Crop			Ratoon crop			II Plant crop		
	NoP	P (5t ha^{-1})	Mean	Nop	P (5t ha^{-1})	Mean	NoP	P (5t ha^{-1})	Mean
1. Control	1.31	2.70	2.15	1.25	1.94	1.39	1.38	2.99	2.44
2. $FeSO_4$ (100 kg ha^{-1})	2.01	3.12	2.57	1.25	2.36	1.81	2.30	3.41	2.86
3. $ZnSO_4$ (37.5 kg ha^{-1})	1.61	2.72	2.17	0.85	1.96	1.41	1.90	3.01	2.46
4. ZnEP (7.5 t ha^{-1})	2.61	3.72	3.17	1.85	2.96	2.41	2.90	4.01	3.46
5. FeEP (7.5 t ha^{-1})	1.85	2.96	2.41	1.09	2.20	1.65	2.14	3.25	2.70
6. T2+T3	2.11	3.22	2.67	1.35	2.46	1.91	2.40	3.51	2.96
7. T4+T5	2.86	3.97	3.42	2.10	3.21	2.66	3.15	4.26	3.71
8. Foliar spray*	1.63	2.74	2.19	0.87	1.98	1.43	1.92	3.03	2.48
9. State MN mixture	2.63	3.74	3.19	1.87	2.43	2.15	2.92	4.03	3.48
Mean	2.10	3.21	-	1.34	2.39	-	2.39	3.50	-
	M	S	M@S	M	S	M@S	M	S	M@S
CD (P=0.05)	0.21	0.22	0.28	0.18	0.20	0.24	0.20	0.21	0.26

NoP - No pressmud ; P – Pressmud;MN - Micro nutrient; ZnEP - Zinc enriched pressmud; FeEP - Iron enriched pressmud, * Foliar spray - $FeSO_4$ (1%) + $ZnSO_4$ (0.5%) at 45th & 90th DAP

sugar yield was computed. Post harvest soil samples were analysed for pH, EC (Jackson,1973), organic carbon (Walkley and Black,1934) and available micro nutrients by DTPA extraction(Lindsay and Norvell, 1978).

Results and Discussion

The results on cane yield, CCS per cent, sugar yield and DTPA extractable micro nutrients in soil are presented in Tables 1, 2, 3. It was observed from the results that foliar spray of $FeSO_4$ (1%)+$ZnSO_4$ (0.5%) twice (45 and 90 DAP) coupled with pressmud application (5 t ha^{-1}) registered highest cane yield of 140.7 t ha^{-1} whereas control treatment recorded the lowest cane yield (100.6 t ha^{-1}). The treatments zinc enriched pressmud+iron enriched pressmud and state micro nutrient mixture application recorded the cane yield of 131.0 and 132.0 t ha^{-1} respectively which were on par with each other. Incorporation of micro nutrient enriched pressmud had profound influence on cane yield over soil application of $FeSO_4$ and $ZnSO_4$. The additive effect of pressmud addition was also observed in the present investigation. In the presence of pressmud, foliar spray of micro nutrients has increased the cane yield which is in agreement with the findings of Kumaresan *et al.* (1985).

Juice quality parameters were not much influenced by the treatments. However, sugar yield varied significantly due to variations in cane yield registering the maximum sugar yield of 15.8 t ha^{-1} and minimum of 9.2 t ha^{-1} in the control treatment. Application of $FeSO_4$ (1%)+ $ZnSO_4$ (0.5%) at 45th and 90th DAP through foliar spray was superior to all other treatments. The role of micro nutrient enriched pressmud in improving iron and zinc availability in soil was quite observed. Iron and zinc enriched pressmud application @ 7.5 t ha^{-1} improved the soil micro nutrient availability recording 17.7ppm iron and 3.97ppm zinc as compared to the initial status (Fe-13.7 and Zn-1.50ppm). Use of enriched pressmud might have supplied the micro nutrients especially zinc enhanced their availability to crops.

Similar trend of results were obtained in the ratoon crop and second plant crop and the results showed that foliar application of $FeSO_4$ (1%)+$ZnSO_4$ (0.5%) at 45 and 90 days after planting along with pressmud 5t ha^{-1} recorded the maximum cane yield of 134.3 t ha^{-1} and 141.8 t ha^{-1} and sugar yield of 14.9 t ha^{-1} and 16.2 t ha^{-1}.

References

Jackson,M.L.(1973). Soil Chemical Analysis. Prentice Hall of India (P) Ltd., New Delhi.

Jayabal,V., Tamilselvan, N. and S.Enayathullah Shah. (1991). Effect of zinc and boran on yield and quality of sugarcane. *Co-operative Sugar,* **22** : 659-660

Kumaresan,K.R., Savithri,P., Manickam,T.S., Kothandaraman,G.V. and Charles Daniel. (1985). Effects of application of pressmud, $ZnSO_4$ and $FeSO_4$ on yield and quality of sugarcane. *Madras Agri.J.* **72:** 704-705.

Lindsay,W.L.and Norvell.W.A. (1978). Development of DTPA soil test for zinc, iron, manganese and copper. *Soil Sci. Soc. Am. J.* **42:** 421-428

Walkley,A. and Black,J.A.(1934) An examination of the Degtjareff method for determining soil organic matter and a proposed modification of chromic titration method. *Soil Sci.* **37:** 29-38.

(Received: August 2001; Revised: November 2001)

Madras Agric. J. 88 (10-12) : 596-602 October-December 2001

Extension education strategies for converting non-cotton growers into cotton growers in Tamil Nadu

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Abstract : The purpose of extension education is to change the behaviour of the people in terms of their knowledge, attitude and skill on any subject. At present Tamil Nadu State is facing huge deficit in cotton kapas. To meet the deficit, the State Government is spending large amount in importing kapas from other areas to meet our industries need. To overcome the above deficit, Govt. has to increase the cotton area, production and productivity in future. To achieve the above set goals, converting non-cotton growers into cotton growers is one of ways to increase the cotton area, productivity and production. Hence, the study was performed in Salem district of Tamil Nadu. By employing snow ball sampling technique 72 non-cotton growers were selected from the three taluks of the above district. Multiple group random design was used in this study. Three treatments *viz.* Lecture + Field Visit + Discussion Forum (T_1), Lecture assisted with Slide show + Demonstration + Discussion Forum (T_2), Lecture + Video + Discussion Forum (T_3) was developed and executed to assess the respondents knowledge gain, knowledge gain related to skill and symbolic adoption behaviour in the study for developing appropriate extension education module. And these treatments were replicated thrice in all the selected taluks. For assessing the treatment effects, before and after technique was used. It was found that T_2 and T_1 were effective among all the non-cotton growers in terms of knowledge gain, knowledge related to skill and symbolic adoption behaiour in cotton cultivation. Based on the above experimental result the best extension education module was proposed to the Government Agency, NGO's and Private for converting non-cotton growers into progressive cotton growers in the State. *(Key Words: Non-cotton growers, Extension education module, Knowledge gain, Knowledge related to skill, Symbolic adoption behaviour).*