https://doi.org/10.29321/MAJ.10.A02667

Madras agric. J. 70. (10): 656-660 October 1983

ASSESSMENT OF AVOIDABLE LOSS IN HYBRID 4 COTTON DUE TO PESTS AND DISEASES & WEED

M. MURUGESAN RAMJIBHAI[1] and M. PATEL[2]

An "avoidable loss" of 1889 kg/ha of *Kapas* (78 per cent) could be saved if plan protection measures against pests and diseases were undertaken in H_4 cotton. The avoidable loss was less in crop sown on 15th June (72 per cent) than crops sown or 1st of July and 15th of July which was 81 and 77 per cent respectively. Out of six pickings, the avoidable loss in *Kapas* was very high in the first, second, third and fourth pickings which were 84, 87, 87 and 72 per cent respectively.

Every year some pest or disease takes a heavy toll of the yield, and the loss is significant; some times the quality of the crop suffers; hence the produce becomes less valuable A great deal of the skill in farming lies in avoiding such losses to crops. Objective and quantitative estimate of the incidence of pests and diseases and consequent losses to crops were not available in this country till 1967. Kittock and Pinkas (1971) estimated comparable loss in lint yield due to bollworm alone to be 3.6 per cent. Agarwal and Katiyar (1979) reported the losses in cotton *Kapas* due to bollworm to be 35.9 per cent due to pink bollworms. No study has been reported on assesment of crop losses due to to both pests and diseases in cotton. Hybrid 4 (H_4) cotton is the most popular cotton grown throughout the state of Gujarat. In view of the fact that crop loss assesment due to both pests and diseases is not available in Gujarat State of Hybrid 4 cotton, an investigation was taken up for assessing the loss in *kapas* yield of Hybrid 4 cotton.

MATERIAL AND METHODS

The experiment was conducted in two environments in first year and one environment in the second year. The crop for Environment-1 (E_1) Environment-2 (E_2) and Environment-3 (E_3) was sown on 15th of June, 1979, and 1st of July 1980.

Two plots were raised with Hybrid 4 cotton, one of which was treated (T) and the other was unprotected control (C). In the treated plots the crops was protected with the recommended plant protection schedule of the Gujarat Agricultural University for Hybrid 4 cotton after with a modification by including fenvalerate, a synsthetic pyrethroid in the schedule. First spraying was started 45 days after sowing (DAS) and subsequent sprays/dusting were done at 15 days intervals except in the month of October when weekly spraying dusting was done. The following is the sequence of the chemicals used in schedule. 1, Fenvalerate 0.02% spray, 2, Endosulfan 0.075% spray, 3. Carbaryl 0.2% spray, 4, Fenvalerate 0.02% sp-

ray, 5, Endosulfan 0.075% + DDT 0.2% + Copper Oxychloride 0.2% spray, 6, Carbaryl 10% dust, 7, Fenvalerate 0.2% spray, 8, Phosalone 0.087% + Copper oxychloride 0.2% spray, 9, Fenvalerate 0.2% spray, 10, Phosalone 0 087% spray, 11, Carbaryl 10% dust, 12, Endosulfan 4% dust.

All the treated plots received basal soil application of aldicarb 10G @ 10 kg/ha.

Randomised complete blocks design was adopted with the treatments with 10 blocks under each environment. These paired plots are similar to those recommended paired plots in vogue for yield loss assessment studies (Leclerg, 1970). The gross plot size was 6m x 6m and plants were spaced at 1.5m x 0.6m. The yield was recorded from the net plot of 4.8m x 3m by eliminarting two border rows and two end plants.

The "avoidable loss" in *Kapas* yield was worked out by deducting mean kapas yield in control plots from mean *Kapas* yield in kg/ha in treated plots and expressed as percentage to the yield obtained in treated plots.

The analysis of variance for picking wise *kapas* yield data for treated and control plots in each environment was carriad out in log (X + 1) scale since the "within variances" for all the pickings were found to be heterogenous and some of the values were zeros. The pooled analysis of *kapas* yield from all the three environments was done with the assumption that picking, treatment and environment effects were fixed.

RESULTS AND DISCUSSION

Although many pests and diseases attack cotton crop in Gujarat the incidence of jasid, aphid, ash weevil, red cotton bug, dusky cotton bug, spotted bollworm on shoot, squares and bolls, Heliothis and injury caused by Alternaria leaf spot disease only was noticed during the course of the investigation.

The estimates of avoidable loss in overall *kapas* yield showed that in all the three environments E_1, E_2 and E_3 there were significant avoidable losses in *kapas* yield of 1430, 1722 and 2514 kg/ha respectively; with an overall yield loss of 1889 kg/ha of *kapas* The avoidable loss worked out to be 71.9, 76.7 and 81.3% in E_1, E_2 and E_3 respectively with an overall yield loss of 78.2%. The analysis of variance revealed that there was significant interaction of treatments with environments.

It was found that all the main effects viz. environments, treatments and pickings and all the two factor and three factor interactions were significant at P=0.01 (Table 2).

In E_1 the first picking of treated plots gave the highest yield (1192 kg/ha) followed by the second picking (341 kg/ha. The remaining four picking yields were very low ranging from 68 to 175 kg/ha. In control plots also the first picking gave the highest yield of 322 kg/ha of *kapas* followed by second picking (91 kg/ha). The yield in rest of the four pickings were low ranging from 23 to 43 kg/ha. In all the pickings treated

plots always gave siginificantly higher yield than control plots except in fourth picking where in yield of treated and control plots was not significant.

In E_1 the first three picking yield which ranged from 424 to 823 kg/ha in treated plots did not differ significantly from each other. These yields were however significantly higher than the last three pickings which were different from each other with *kapas* yield of 212, 103 and 33 kg/ha in fourth, fifth and sixth pickings respectively. In the control plots, first picking gave significantly lowest yield of 26 kg/ha which increased gradually upto 106 kg ha in the fourth picking and dropped significantly in sixth picking (62 kg/ha). These results further revealed that treated plots gave highest yield in the first three pickings but in fourth and fifth pickings the difference among treated and control plots did not differ significantly. The treated plots gave low yield in the sixth picking. This is probably due to early maturity and uniform bursting of the bolls in the treated plots which are ready for picking in large numbers in the first five pickings.

The results of yield data in E_2 showed that the mean yield of the first four pickings in treated plots ranging from 569 to 878 kg/ha was not significantly different from each other. The last picking gave the lowest *Kapas* yield of 45 kg/ha. The pattern of pickingwise yield in control plots was different from that of treated plots. The mean yield in kg/ha in first picking was just 79 kg only which did not differ from the second and fpurth picking yield. The highest yield was recorded in fifth picking (197 kg/ha) which again was not significantly different from the sixth picking yield (116 kg/ha). In all the first five pickings the treated plots gave significantly higher yield than the control plots except in the final packing where the treated plots yielded lower than the control plots. It is mainly due to the fact that the crop in the treated plots completed its yielding potential in the five packings itself and no fresh bolls were left out for bursting for the sixth picking.

The overall pickingwise yield showed that the treated plots gave 80 per cent of total yield in the first four pickings whereas in control plots there were five pickings to complete 86 per cent of *kapas* yield. The avoidable loss in *kapas* yield was very high in the first, second, third and fourth pickings which were 84.26, 86.70, 87.19 and 72.42 per cent respectively. In the last picking the percentage of avoidable loss was only 12 90 as compared to the earlier pickings. Thus these results clearly indicate that the loss in *kapas* yield would be very high in the first four pickings if plant protection was not adopted The crop produced the largest proportion of its total kapas yield (89 per cent) in the first four pickings if plant protection measures were adopted. This would facilitate the farmer who can remove the crop after the fourth picking 180 days after sowing when the crop is protected from pests and diseases and utilise the land for raising any other crop, wherever irrigation facilities are available.

This paper forms part of the Ph. D thesis of the first author accepted by the Gujarat Agricultural University. The first author is grateful to the K. A. R. New Delhi for awarding him the Senior Research Fellowship and the Tamil Nadu Agricultural University for granting him study leave.

REFERENCES

ABRAHAM, T P., and R. K. KHOSLA, 1967. Assessment of losses due to incidence of pests and diseases on rice crop. *J. Ind. Soc. Agri. Stat.*, 19 : 69-82.

AGARWAL, R. A. and., K. N. KATIYAR 1979. An estimate of losses of seed kapas and seed due to bollworms on cotton in India *Indian J. Ent.* 41 : 143-148.

KITTOCK, D L., and L L. H. PINKAS 1971. Effect of pink bollworm on cotton seed and fibre. *Cotton Crowing Review*, 41 : 210-217.

LE CLERG, E. L. 1970 Field Experiments for assessment of crop losses. In *Crop loss assessment methods* (Chiaroppa, L. Ed.) FAO manual on the evaluation and prevention of losses by pests, diseases and weeds. Rome. FAO pp 2. 1/1-2. 1/16.

SETH, G R, SARDANA, M. G. and R. K. KHOSLA, 1969. Field losses caused by pest and diseases in paddy crop *Agricultural Situation in India*, 24 : 713-720.

Table 1 Avoidable loss of *kapas* yield in H 4 control.

Environment	Pooled analysis		F Test	Avoidable Loss		
	Treat	Cont		Kg/ha	%	SE
E_1	1987.9	558.2	++	1429 7	71.92	6.49
E_2	2161.1	439 3	++	1721 8	79.67	3.57
E_3	3093.6	579.3	++	2514.3	81.27	3.86
Overall	2414.2	525.6	++	1888 6	78.23	2.55

S E. and C. D. (P=0.05) in Pooled analysis

Source	F test	S E of Mean	CD (P=0 05)
Environments	++	55.4	160 6
Treatments	++	45.2	131.2
Environments x Treatments	++	78.3	227.2

++ — Significant at P. = 0.01

Table-2 Picking-wise Mean kapas yield (kg/ha) in three environments

Picking	Environment E_1			E_2			E_3			Mean over E		P means over E and T
	Treat	Cont	Mean	Treat	Cont	Mean	Treat	Cont	Mean	Treat	Cont	
P_1	3 072	2.434	2.753	2.888	1.242	2.065	2 826	1.859	2.341	2.929	1.844	2.386
P_2	2.508	1.898	2.203	2.622	1.614	2.118	2.934	1.726	2.330	2.688	1.746	2.217
P_3	2.019	1.483	1.751	2.728	1.928	2 372	2.750	1.428	2.089	2.498	1.613	2.056
P_4	1.728	1.480	1.603	2 241	2.012	2.127	2.752	1.940	2.346	2.241	1.811	2.026
P_5	1 962	1.472	1.555	1.928	1.958	1 943	2.513	2.217	2.365	2.134	1.774	1.954
P_6	2.212	1.612	1.912	0.820	1.669	1.245	1.654	2.031	1.839	1.559	1 771	1.665
Mean	2.250	1.676	1.963	2.204	1.738	1.971	2 570	1 866	2.218	2.341	1.760	2.061

SE and CD (P=0.05) in Pooled analysis

Source	F test	SE	CD (P=0.05
Environments	**	0 026	0.072
Treatments	**	0.021	0 059
Pickings	**	0 037	0.102
Environments x Treatments	**	0.037	0.102
Environments x Pickings	**	0.064	0.177
Pickings x Treatments	**	0 052	0.144
Enviornmeuts x Treatments x Pickings	**	0 090	0.250

**Significant at P = 0.01