

Effects of Mulching Duration on the Yield of Intercrop Potato and Intercropped Sugarcane

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ABSTRACT

An experiment was conducted at the Sugarcane Research and Training Institute (SRTI), Ishurdi, Pabna to investigate the effect of duration of straw mulch on potato intercrop as well as intercropped Sugarcane. Straw mulch played a positive role to increase the yield of both potato and sugarcane. Significantly the highest potato yield (6.45 t/ha) was obtained from mulched treatment till harvest of potato as against 4.72 t/ha in non-mulching condition. Higher cane yield was also found in straw mulched treated plots. The highest adjusted yield of cane + potato (117.85 t/ha) was obtained where straw mulch were kept until harvest of potato as compared to other mulched treated plots. The lowest yield of cane was produced by purestand sugarcane plots (82.98 t/ha). The yield of potato and cane was found to increase steadily with the increase in the duration of straw mulch. Higher gross and net margin may be gained with straw mulching till harvest of potato intercropped with sugarcane.

INTRODUCTION

In Bangladesh, both sugarcane and potato are grown in winter season under rainfed condition in most cases. Although growing of potato as intercrop with sugarcane is very economic but in farmers conditions yield of potato as well as sugarcane is not satisfactory mainly due to serious moisture stress during the growing period of the crop. If a fair uniformity in moisture content of soil can not be maintained throughout the growing season it affects both the yield and quality of potato (Ahmed, 1977). Although irrigation is considered necessary for successful production of potato and sugarcane crops but irrigation facilities is however very limited in sugarcane growing areas. Mulching is reported to conserved soil moisture, reduce soil temperature, minimize evaporation loss and enhance root growth. (Allamaras *et al.* 1977; Chowdhury and Prihar, 1974). Application of mulch soon after planting is beneficial in cultivation of some root and tuber crops (Awal *et al.* 1978; Onwueme, 1987; Jha *et al.* 1983; Anon, 1985). Some growers use artificial mulches such as straw and water hyacinth either at planting or after emergence of sole potato to conserve soil moisture. Mulching in potato intercropped sugarcane is not a common practice probably because, it creates inconvenience in top dressing and intercultural operations in sugarcane. Sometimes removal of mulches becomes essential to facilitate earthing up of potato and practice of soil mulch to sugarcane. Studies on duration of mulch to intercropped potato and its effect on both potato and sugarcane has not been done in Bangladesh. So an experiment was undertaken at SRTI farm during 1986-87 and 1987-88 crop seasons to study the effect of duration of straw mulch on the yield of potato as well as sugarcane.

MATERIALS AND METHODS

The experiment was carried out with the following treatments laid out in RCB design with four replications.

- T₁ : Sugarcane + Potato without mulching.
- T₂ : Sugarcane + Potato with straw mulch upto 30 days of planting.
- T₃ : Sugarcane + Potato with straw mulch upto 45 days of planting.
- T₄ : Sugarcane + Potato with straw mulch without removal of mulch.
- T₅ : Sugarcane as purestand crop without mulching.

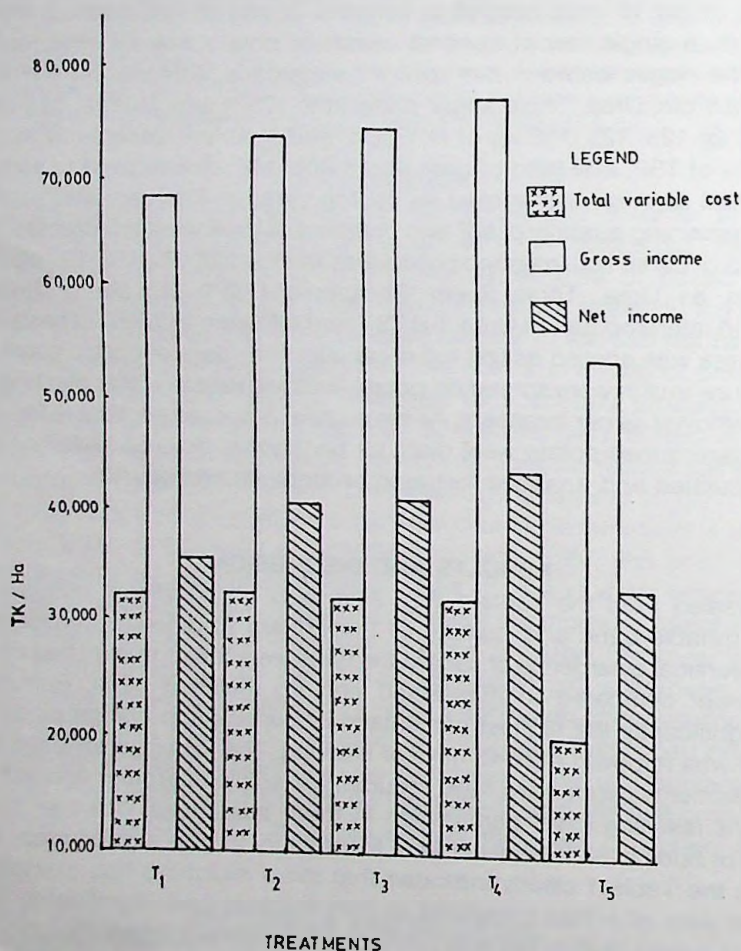
The land preparation and trenching for sugarcane planting was done mechanically by tractor. Soils of the ridges in between two trenches were spread with the spade for potato plantation. The individual plot size was 6m x 6m (36 sqm.). Three budded setts of Isd 16 were planted in trenches in end of end method with the row spacing of 1m. A single row of cardinal variety of potato was as intercrop and was planted on the ridges between two rows of sugarcane with the planted at a plant spacing of 22.5 cm. Urea, Triple sugar phosphate (TSP) and Muriate of Potash (MP) were applied @ 125, 125, 110 kg of N, P₂O₅, and K₂O/ha respectively in cane. The entire quantity of TSP, one third of urea and half of MP were applied to sugarcane as basal, one third of Urea was applied as 1st top dress in February after harvesting of potato. The remaining quantity of MP and one third of Urea were top dressed at the time of earthing up of cane. The intercrop potato was fertilized @ 120, 150, 120 kg of N, P₂O₅ and K₂O/ha as Urea, Triple Super Phosphate (TSP), Muriate of Potash (MP) respectively. In intercrop half of Urea, full TSP and MP were applied as basal dose. The rest half of Urea was applied as first top dress after forty days of potato planting. About 5 cm thick straw mulch were spread on potato lines immediately after planting. Mulched straw were removed as per treatment. All the cultural practices applicable for sugarcane as well as intercropped potato were done as per normal practice. Relevant data were collected, tabulated and analysed following appropriate procedures.

RESULTS AND DISCUSSION

It is revealed from the Table 1 that there was no significant difference in tiller production, millable cane and number of tuber/plant at different treatments. Almost statistically identical emergence of sugarcane buds were found in mulched treated plots and were lower compared to purestand and no mulched cane. Purestand cane produced significantly the highest percentage of germination compared to treatment where much was removed after 45 days of planting. The lower germination of cane in mulching treatments might have reduced the soil temperature around the sett in winter months resulting lower germination in these treatments. However, the average germination of buds in all treatments were satisfactory to give a good crop. The results as shown in the Table 1 clearly indicated that straw mulching has exerted beneficial effect on the yield of potato compared to non-mulched one. Significantly the highest mean yield of potato (6.45 t/ha) was produced in treatment where mulching was kept until harvest of potato as against (4.18 t/ha) in no mulch treatment. This result was confirmed by the findings of Rashid *et al.* (1981) who obtained the highest yield of potato by water hyacinth mulching with or without ridging followed by straw mulching

Table 1. Effects of mulching on yield of potato and intercropped sugarcane and their economic analysis.

Treatments	Germination (%)	Tiller Count '000/ha	Millable cane '000/ha	Yield of cane (t/ha)	Recoverable sucrose (%)	Number of tuber/plant	Yield of potato (t/ha)	Adjusted yield (t/ha)	Profit/ loss over control (Tk/ha)
T ₁	45.58 ab	158.75 a	91.18 a	87.35 ab	10.94 ab	4.72 a	4.18 a	104.75	(+) 2209.88
T ₂	42.89 ab	163.68 a	92.07 a	89.50 ab	10.94 ab	4.69 a	5.63 ab	112.93	(+) 7477.80
T ₃	40.45 b	166.87 a	93.47 a	89.63 ab	10.34 b	5.26 a	5.77 ab	113.64	(+) 7935.04
T ₄	44.97 ab	169.37 a	90.70 a	91.01 a	11.01 ab	5.56 a	6.45 bc	117.85	(+) 10646.20
T ₅	48.09 a	164.93 a	94.79 a	82.98 b	11.81 a	—	—	92.98	—

**Figure 1. Cost-benefit of sugarcane and intercrop potato in different mulching condition.**

on ridging. The higher yield of potato was supported by the production of higher number of tuber per potato plants in the mulching treatments. Significantly the highest yield of cane (91.01 t/ha) was also found in the same treatments. Although there was non-significant difference of cane yield among mulching treatments of different duration and non mulched treatments. The higher yield of cane in mulch treatments were supported by production of higher number of tiller and millable canes per unit area.

The augmented yield of potato and cane under mulched treatments may be attributed due to conservation of soil moisture as well as weed control. The Table 1 further indicated that yield of cane was significantly higher in potato intercropped plots irrespective of mulch duration as compared to non-intercropped cane. Similar beneficial effect of intercropped potato on cane yield were reported elsewhere (Kanwar, 1985; Imam, 1982; Rathi *et al.* 1980 and Imam *et al.* 1987). Rathi and Singh (1980) reported that sugarcane yield increases probably due to the residual effect of fertilizer applied to potato and improvement in the physical, chemical and biological condition of soil. The highest adjusted yield (cane yield + potato; yield converted into cane yield) was obtained in straw mulching treatment durated till harvest of potato. These yield were found to reduce gradually with the shortening of duration of mulch indicating advantageous effect of mulching.

The profit/loss accounting over sole sugarcane showed that the highest profit (Tk. 10446.28) was obtained where mulch were not removed and was followed by gradual shortening of mulch duration in other treatments. No removal of mulch treatment was found superior to other treatment in all parameters studied in this experiment. The benefit cost analysis of cane-potato are shown in the Figure 1, wherein it is be seen that the total variable cost in potato intercropping and mulching treatments were almost identical but the gross and net income were much higher in the treatment where straw mulches were allowed till harvest of potato. From the above results it may be concluded that mulching has a great impact on potato as well as sugarcane yield under intercropped condition. Since longer duration of mulches exerted higher beneficial effect on both potato and sugarcane yields it may be recommended that straw mulch on intercropped potatoes be allowed till harvest of potato.

REFERENCES

- Ahmed, K.U. 1977. Potato for the tropics. First Edition : p.53.
- Allamaras, R.R.; Hallaner, W.W.; and Evans, S.D. 1977. Surface energy balance and soil thermal property modifications by tillage induced soil moisture. Tech. Bull. 306. University of Minnesota.
- Anonymous, 1985. Potato production in the warm tropics, the importance of irrigation and mulching. CIP Circular, **13** : 4-5.
- Awal, M.A.; and Rashid, M.M. 1978. The effect of method of seed bed preparation mulching and inter tillage on the growth and yield of Mukhi Kachu (*Colocasin esculenta* shoot. Var globulefera). *Bangladesh Hort.*, **6** : 9-13.

- Choudhury, M.R. and Prihar, S.S. 1974. Root development and growth response of corn following mulching, cultivation and inter row competition. *Agron. J.*, **66** : 350-355.
- Imam, S.A.; Ali, A. and Razzaque, M.A. 1982. Performance of intercropping with sugarcane under several crop combinations. *Bangladesh J. Sugarcane*, **4** : 32-41.
- Imam, S.A.; Ali, M.; Moslemuddin, S.M. and Hossain, A.H.M.D. 1987. Performance of intercropped sugarcane under reduced fertilizer management. *Bangladesh J. Sugarcane*, **9** : 77-82.
- Tha, R.C.; Sharma, N.N. and Maurya, K.R. 1983. Effect of sowing dates and mulching on the yield and profitability of Turmeric (*Curcuma longa*). *Bangladesh Horti*, **11** : 1-4.
- Kanwar, R.S. 1985. Scope of intercropping in sugarcane in North India. *Indian Sugar*, **25** : 187-189.
- Onwueme, I.C. 1987. The tropical tuber crops. John Willey & Sons. Chichester. p. 234.
- Rashid, A.; Ahmed, K.U. and Habib, A.K.M.A. 1981. Effect of artificial mulching on the performance of potato. *Bangladesh Horti*, **9** : 24-27.
- Rathi, K.S. and Singh, R.A. 1980. Intercropping of sugarcane multiple cropping. *Indian Soc. of Agron.*, New Delhi. pp. 310-313.