http://www.pjbs.org

PJBS

ISSN 1028-8880

Pakistan Journal of Biological Sciences

ANSInet
Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Pakistan Journal of Biological Sciences, 2 (1): 217-219, 1999 *Research Article*

Impact of Various Weed Control Methods on the Productivity and Quality of Sugarcane

Maqbool Akhtar and Rashid Ahmed*
Sugar Crops Programme, National Agricultural Research Centre, Park Road, Islamabad 45500,
*Department of Crop Physiology, University of Agriculture, Faisalabad-38040, Pakistan

Abstract

A mixture of atrazine and ametryn was used at 3.4 kg ha^{-1} at planting and 90 days after planting to compare their effectiveness in controlling weeds and improving yield in sugarcane. Other treatments were planting wheat as intercroping sugarcane to suppress weeds and weedy check. Both pre-emergence and 90 days after planting (DAP) application of Atrazine arid Ametryn produced significantly taller stalks than other treatments. Cane stalks in control plots were the shortest. Stalk height at harvest (409 cm) and cane yield (168.79 ha^{-1}) were the maximum in plots where herbicide was applied as pre-emergence. Control plots produced the shortest stalks and the minimum cane yield (59.04 t ha^{-1}). Similar trend was observed in total dry matter as in cane yield. Pre-emergence application of herbicide resulted in 185.9 percent increase in cane yield and 125.4 percent increase in total dry matter over control. Various weed control methods did not affect the sugar contents in the juice.

Introduction

Sugarcane is grown in the tropical and sub-tropical regions of the world. In many places of the world, like Hawaii, it is grown for a period of 24 to 36 months while in other countries, like Pakistan and India, its age goes from 10 to 16 months. Being a long duration crop its nutritional requirements are higher than many other crops. There are many factors those results in the reduction of cane yield. Among those weeds are of great importance that cause a reduction of 40 percent in cane yield (Hussain, 1983; Ibrahim, 1984). Weeds also provide habitat for plant pathogens and serve as host for harmful insect pests (Mehmood and Khan 1987; Shad *et al*., 1993). Ahmad and Akhtar (1978) have observed 16-20 percent increase in cane yield with suitable weed control measures.

Traditionally weeds are controlled by manual labour and with other cultural practices. These methods are time consuming and expensive due to increased labour costs. However, with the scarcity of manual labour and intensive crop production, introduction of chemical weed control was necessary to be introduced that replaced traditional weed control measures (Chambers, 1983). Chemical weed control methods are more effective in controlling weeds without any adverse effect on cane quality and are time saving. Rahman *et al*. (1989) and Zainullah *et al*. (1990) have also reported efficient weed control with the use of weedicides in sugarcane. Santo (1989) has recommended the use of surfactants with all post-emergence herbicides, like, ametryn, diuron, & atrazine etc. for effective weed control in sugarcane.

Ahmed *et al*. (1994) observed significant reduction in weed density, increased biological and grain yield in wheat with hand weeding and application of weedicides. Awan *et al*. 1993) have reported significant increase in number of tillers per plant, number of spikelets per penicle. grain weight in rice and decrease weed biomass. Ahmed *et al*. (1994) recorded significant increase in onion yield, plant height, bulb size, bulb weight and reduced weed density with the application of herbicides. Afzal *et al*. (1995) have observed that the application of gesapax combi at 2.5 kg ha^{-1}, with surfactant, was more effective in controlling sugarcane weeds and it produced significantly higher cane yield than Gesapax combi alone.

In areas of high rainfall where soil erosion is a problem, higher canopy cover is considered beneficial to conserve the soil. Intercropping is one of the many options to maintain proper soil cover that will also suppress weeds and Hawaii is among those paces where heavy soil losses are observed due to heavy rainfall, Keeping in view the importance of weed control the current study was planned to observe the impact of various weed control methods on the productivity and quality of sugarcane.

Materials and Methods

The experiment was conducted during the years 1993-94 at Waimanalo Research Station of the University of Hawaii, Honolulu. Sugarcane variety H74-4527 was planted at a row spacing of 1.5 m. Sugarcane seed pieces, eighteen inches long with 2-3 buds were planted. In 4 rows with a plot size of 6×8 m in 4 replicates. The crop was grown for one year with following treatments

1. Control = no weeding
2. Intercrop = Wheat planted at a row spacing of 0.20 m in between the cane rows.
3. Weedicide pre-em = Application of Atrazine + Ametryn at 3.4 kg ha at planting.
4. Weedicide Post-em = Application of Atrazine + Ametryn at 3.4 kg ha 90 days after planting.

All other agronomic treatments like fertilizer application, irrigation, insect pest control etc. were similar for all treatments. The data was collected from the middle two rows for stalk height and cane yield. A sub-sample of cane stalk weighing 1 kg was taken for sugar analysis. Another sample of 1.5 kg each for cane stalk, trash and green tops was taken to record dry matter. These samples were dried up in convection oven at a temperature of 70°C till a constant dry weight was obtained. Data collected on various agronomic characteristics were analyzed statistically using analysis of variance technique at 5 percent probability level (Steel and Torrie, 1980).

Results and Discussion

Cane stalk height: Stalk height was measured from the first node to the top most developed node and then averaged taking ten representative stalks from each plot. The results indicated that stalk height was not significantly different in both chemical weed control methods (Table 1). However, stalks were tallest (409 cm) in plots where herbicide was applied as pre-emergence. Stalks in weedy check were the shortest (262.5 cm). Wheat as intercrop also suppressed weeds and produced significantly taller stalks than control. Application of herbicides at planting resulted in the tallest stalks (Table 1). Presence of weeds in weedy check and wheat in intercropped plots competed for nutrients, moisture and other resources with cane plants that resulted in the production of shorter stalks. On the other hand application of herbicides controlled the weeds and there was no competition for the available resources that ultimately resulted in taller and healthy stalks.

Cane yield: The difference in cane yield among all the weed control methods was significant (Table 1). Application of herbicide at the time of planting produced maximum cane yield of 168.79 tones per hectare that was 185.9 percent higher than the weedy check. Application of herbicide at 90 days after planting produced 153.59 tones of cane per hectare that was 160.14 percent higher than the control. Control plots produced the lowest cane yield of 59.04 tones per hectare. Cane intercropped with wheat produced 96.69 tones of cane per hectare. Application of herbicide at planting controlled weeds from the beginning hence the cane yield was maximum in this treatment. Application of herbicide at 90 DAP resulted in some competition between weeds and cane at least for 90 days that affected the initial grow th and ultimately affected the cane yield. Wheat intercropped with cane also competed with cane for various available resources up to its harvest and hence affected the cane yield. When wheat crop was harvested and spread between the cane rows, it helped controlling weeds. Weeds in weedy check affected the cane plants throughout the year and reduced the cane yield significantly. Effective weed control and increased cane yield with the application of herbicide has been reported by Makhdoom *et al*. (1986), Rahman *et al*. (1989), Zainullah *et al*. (1990) and Afzal *et al*. (1995).

Total dry matter: Total dry matter included cane stalks. trash and green tops. Trend in the production of total dry matter by various weed control methods was similar as of cane yield. The difference in total dry matter was significant among all the treatments (Table 1). Application of herbicide at planting resulted in proper weed control at early stages and aft the resources were properly available to cane plants. This resulted in vigorous and healthy crop and produced maximum total dry matter. Weedy check produced the lowest amount of total dry matter due to the heavy weed infestation that resulted in competition for the resources with cane plants reducing the growth and total dry matter accumulation in cane crop.

Sugar contents of the juice (POL%): Various weed control methods did not affect the sugar contents of the juice (Table 1). The applied chemicals do not possess any material that enhances the maturity of the cane. On the other hand weeds in check plots and wheat in intercropped plots competed for various available resources reducing the level of available nitrogen and as a result did not deteriorate the quality of cane juice. There was a non significant difference between the sugar contents of the juice in various treatments (Table 1). These results are not in agreement with those of Rahman *et al*. (1989) who have reported an increase in sugar contents with the application of herbicide.

References

Afzal, M., M.A. Gill, K.B. Malik, M.A. Bajwa and S. Ahmad, 1995. Efficacy of gesapax combi with surfactant triton for the control of weeds in sugarcane. Proceedings of the 4th All Pakistan Weed Science Conference, March 26-27, 1994, Faisalabad, Pakistan, pp: 213-222.

Ahmad, F. and M. Akhtar, 1978. Eradication of weeds from crop field. Zaraat Nama, 17: 19-20.

Ahmed, Z., J.D. Baloch, M. Munir and Q. Nawaz, 1994. Comparative efficacy of different herbicides and their time of application against weeds and yield of bulb onion (*Allium cepa* L.). Pak. J. Weed Sci. Res., 7: 18-24.

Table 1: Effect of various weed control methods on different agronomic characteristics of sugarcane.

Treatments	Stalk height (cm)	Cane yield (t ha^{-1})	Total dry matter (t ha^{-1})	POL (Sucrose%)
Control	262.50c	59.04d	27.38d	14.1a
Wheat as intercrop	330.87b	96.69c	44.80c	14.54a
Herbicide 90 DAP	387.37a	153.59b	54.58b	14.82a
Herbicide at planting	409.00a	168.79a	61.72a	14.51a

Awan, I.U., M. Ramzan and M.A. Khan, 1993. Efficacy of herbicides on direct sown short duration rice (*Oryza sativa* L.) variety KSK-282. Pak. J. Weed Sci. Res., 6: 56-60.

Chambers, G.M., 1983. Perspectives and new developments for agrochemicals in sugarcane. The Sugarcane No. 1, pp: 203.

Hussain, F., 1983. Biochemical inhibition (Allelopathy) a less understood ecological factor in agroecosystems. Progr. Farm., 3: 33-37.

Ibrahim, A.A.S., 1984. Weed competition and control in sugarcane. Weed Res., 24: 227-231.

Makhdoom, M.U., R.M. Brohi and M.A. Irain, 1986. Cane yield as influenced by chemical weed control. Sind J. Agric. Res. (Pak.), 5: 69-79.

Mehmood, T.Z. and A.R. Khan, 1987. Role of weed management in Agriculture. Progr. Farm., 7: 36-41.

Rahman, H.U., K. Zada, S. Rahman and G.S. Khan, 1989. Weed control in sugarcane. Pak. J. Weed Sci. Res., 2: 20-28.

Santo, L.T., 1989. Weed control with cultural and chemical methods in Hawaiian sugarcane. Proc. Western Soc. Weed Sci., 42: 78-82.

Shad, R.A., M. Qasim and H. Nawaz, 1993. Weed management study in maize. Pak. J. Agric. Res., 14: 64-71.

Steel, R.G.D. and J.H. Torrie, 1980. Principles and Procedures of Statistics: A Biometrical Approach. 2nd Edn., McGraw-Hill, New York, ISBN: 9780070665811, Pages: 633.

Zainullah, M., G. Rehman, G.S. Khan and A. Qayum, 1990. Evaluation of different herbicides for efficient and economical weed control in sugarcane. Pak. J. Weed Sci. Res., 3: 99-106.