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Short communication

Assessing the effect of weed management practices in sweet corn under rainfed condition

SHINGLOI H., D. NONGMAITHEM*, A.P.SINGH, LANUNOLA TZUDIR, REKHA YADAV AND NOYINTHUNG KIKON

Department of Agronomy, School of Agricultural Sciences, Medziphema, Nagaland 797106

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Sweet corn (*Zea mays* L.) is a variety of maize having high sugar content. It is a highly nutritious crop with a prominent place as an essential ingredient in many fancy dishes of today because of its delicate and sweet flavours and crop nature. Despite its great importance, the yield obtained of sweet corn in India is far below expectation due to numerous factors. Among the various factors weed interference is a severe problem in corn, competing for resources that influence the morphology and phenology of the crop, thereby reduces the yield. Yogita *et al.* (2018) visualized that between 18-65% of a crop's production can be lost due to weeds. Therefore, to achieve high and remunerative yield of sweet corn, weed management practices must be ensured. Keeping this in view present investigation was under taken.

A field experiment was conducted in the experimental research farm of School of Agricultural Sciences (SAS), Nagaland University, during the *Kharif* season of 2022. The experiment was laid out in Randomized Block Design with three replications consisting of 8 treatments. Sweet corn variety Sugar 75 was sown @ 2 seeds per hill in furrows line 5cm deep in soil and a spacing of 60 cm × 20cm was maintained. The sowing was done on 8th July, 2022. NPK was applied at the rate of 100 kg N + 60 kg P + 40 kg K ha^{-1}. Half dose of nitrogen and full dose of phosphorus and potassium were applied as basal application just before sowing. Remaining dose of nitrogen was top dressed at 25 DAS. As per the treatment, hand weeding was carried out at different interval and the herbicides as per the treatment were applied by knapsack sprayer by mixing with water in desired content. Observation on weed species were recorded at 40 and 60 DAS and expressed as count m^{-2}. The data was then converted to number per square meter and was transformed using square root transformation ($\sqrt{X+0.5}$) to normalize their distribution.

Effect on weeds

The experimental field was infested with broad-leaved weeds like *Mimosa pudica, Ageratum conyzoides, Commelina benghalensis, Bidens pilosa, Sonchus arvensis, Oxalis corniculata, Amaranthus viridis, Acmella oleraceae* and *Chromolaena odorata.* Among the sedges, *Cyperus rotundus* and *Kyllinga brevifolia* were found to be dominant while the common weed species observed among grasses were *Eleusine indica, Cynadon dactylon, Setaria glauca* and *Digitaria sanguinalis.* Different weed management practices have a considerable impact on weed density and dry biomass at 40 and 60 DAS (Table 1). Two hand weeding at 20 and 40 DAS recorded minimum weed density and minimum dry biomass which was closely followed by atrazine @ 1 kg/ha as PE *fb* one hand weeding at 20 DAS and atrazine @ 1 kg/ha as PE *fb* tembotrione @ 0.12 kg/ha as PoE at 20 DAS. Due to lower weed counts and reduced competition over the course of the crop period, twice hand weeding at 20 and 40 DAS produced the least amount of weed biomass. These results are in agreement with the findings of Saimaheswari *et al.* (2022). Two hand weeding showed maximum weed control efficiency (91.75 and 86.19 %) at 40 and 60 DAS. This shows that hand weeding in sweet corn was more efficient in controlling the weeds than other weed management practices. Among the herbicide treatments, atrazine @ 1 kg/ha as PE *fb* one hand weeding at 20 DAS showed highest weed control efficiency which was closely followed by atrazine @ 1 kg/ha as PE *fb* tembotrione @ 0.12 kg/ha as PoE at 20 DAS. Similar views were also endorsed by Singh *et al.* (2018) and Barua *et al.* (2019).

**Email: Debika Nongmaithem*

Table 1: Weed dynamics of sweet corn as influenced by different weed management practices

Treatment	Total weed density (no/m^2)		Total weed biomass (g/m^2)		Weed control efficiency (%)	
	40 DAS	60 DAS	40 DAS	60 DAS	40 DAS	60 DAS
Weedy check	12.00 (143.66)	14.03 (196.66)	7.41 (54.5)	9.11 (82.66)	-	-
Hand weeding at 20 & 40 DAS	3.71 (13.33)	5.75 (32.66)	2.13 (4.06)	3.44 (11.4)	91.75	86.19
Atrazine @ 1 kg/ha as PE *fb* one hand weeding at 20 DAS	4.09 (16.33)	6.76 (45.33)	2.40 (5.33)	4.03 (15.83)	90.33	80.83
Atrazine @ 1 kg/ha as PE *fb* tembotrione @ 0.12 kg/ha as PoE at 20 DAS	4.44 (19.33)	7.02 (49.00)	2.54 (6.04)	4.30 (18.06)	88.89	78.12
Atrazine @ 1 kg/ha as PE *fb* rice straw mulching @ 5t/ha	5.23 (27.00)	7.64 (58.00)	3.02 (8.64)	4.67 (21.40)	84.10	74.11
Atrazine @ 1 kg/ha as PE *fb* banana pseudostem mulching @ 5t/ha	5.14 (26.00)	7.66 (58.33)	2.92 (8.06)	4.54 (20.23)	85.14	75.51
Black gram as inter crop between the rows + atrazine @ 1 kg/ha as PE	5.86 (34.00)	8.57 (73.00)	3.32 (10.60)	4.99 (24.50)	80.52	70.34
Brown manuring (*Sesbania* @ 25 kg/ha) at 25 DAS	10.39 (107.66)	11.96 (142.66)	5.58 (30.76)	7.43 (54.83)	43.50	33.65
CD (P= 0.05)	0.30	0.31	0.17	0.23	-	-

Figures in the parenthesis are the original values, which were transformed to $\sqrt{X + 0.5}$ *and analysed statistically. DAS: Days after sowing*

Effect on growth and yield of sweet corn

Application of atrazine @ 1 kg/ha as PE *fb* one hand weeding at 20 DAS similar to two hand weeding at 20 and 40 DAS recorded higher plant height and plant dry matter than weedy check. This could be the result of weeds being better managed, which allow plants to flourish unhindered by weed competition. Pre-emergence application of atrazine @ 1 kg/ha *fb* one hand weeding at 20 DAS similar to application of atrazine @ 1 kg/ha as PE *fb* tembotrione @ 0.12 kg/ha as PoE at 20 DAS, two hand weeding at 20 and 40 DAS recorded highest girth of cob and number of kernels/cob. Grain yield was highest (3.12 t/ha) in two hand weeding at 20 and 40 DAS and it was found to be statistically at par with atrazine @ 1 kg/ha as PE *fb* one hand weeding at 20 DAS (2.89 t/ha) (Table 2). This is due to the effective weed control during critical crop weed competition which resulted in increased leaf area formation, which enhances solar radiation absorption and favours greater photosynthetic utilization for higher grain yield. This finding was in accordance with Sandhya *et al.* (2019).

Table 2: Growths, yields attribute and yield of sweet corn as influenced by weed management methods

Treatment	Plant height at 60 DAS (cm)	Dry matter at 60 DAS (g/plant)	Girth of cob (cm)	No. of kernels/cob	Grain yield (t/ha)
Weedy check	166.25	32.33	3.69	154.33	0.84
Hand weeding at 20 & 40 DAS	218.75	69.00	6.19	445.00	3.12
Atrazine @ 1 kg/ha as PE *fb* one hand weeding at 20 DAS	214.45	64.83	6.03	417.66	2.89
Atrazine @ 1 kg/ha as PE *fb* tembotrione @ 0.12 kg/ha as PoE at 20 DAS	206.08	60.63	6.00	413.33	2.68
Atrazine @ 1 kg/ha as PE *fb* rice straw mulching @ 5t/ha	199.33	56.83	5.59	373.33	2.47
Atrazine @ 1 kg/ha as PE *fb* banana pseudostem mulching @ 5t/ha	202.16	57.60	5.73	393.00	2.50
Black gram as inter crop between the rows + atrazine @ 1 kg/ha as PE	195.62	55.33	5.16	356.00	2.26
Brown manuring (*Sesbania* @ 25 kg/ha) at 25 DAS	193.26	53.86	4.96	274.66	1.68
CD (P= 0.05)	5.73	4.01	0.11	50.30	0.31

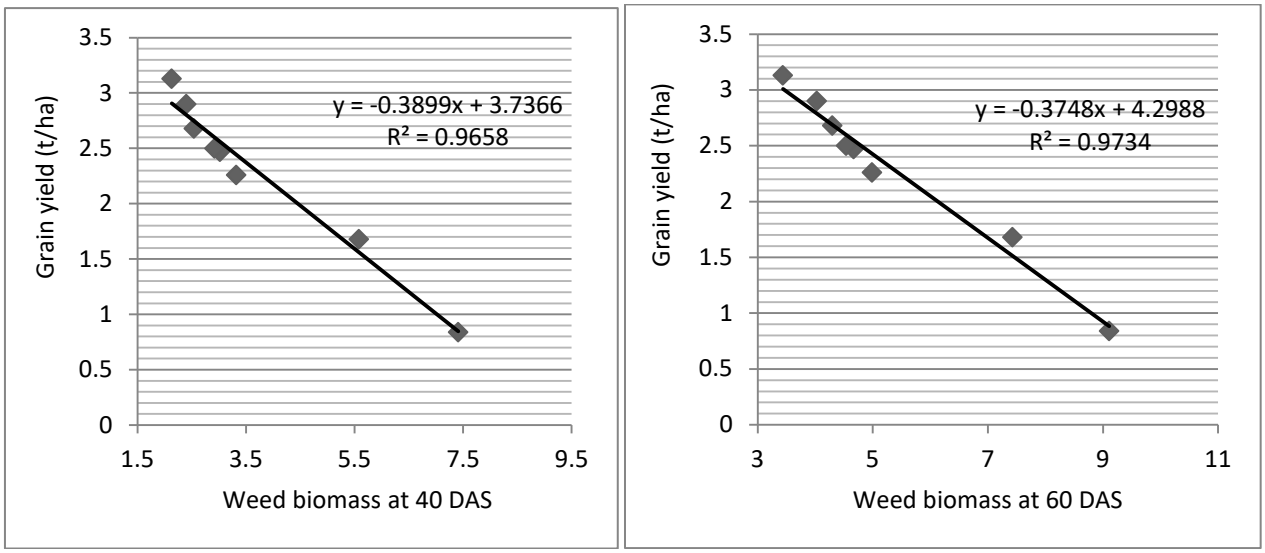

Figure 1: Correlation between grain yield and weed biomass at 40 and 60 DAS as influenced by different weed management practices

Correlation studies

Correlation coefficient was found to be significant between weed density, weed biomass, no. of kernels per cob and grain yield of sweet corn. There was positive correlation between no. of kernels/cob with grain yield (0.993*). However correlation coefficient was negative between grain yield and weed density (-0.971* and -0.987* at 40 and 60 DAS) and weed biomass (-0.983* and -0.986* at 40 and 60 DAS) respectively (Table 3). The linear regression equation describes the relationship between weed biomass and grain yield of sweet corn (Figure 1). There is linear close relationship between grain yield and weed biomass with R^2= 0.965 and 0.973 at 40 and 60 DAS, respectively. The results revealed that weed biomass at 40 and 60 DAS showed a negative correlation with grain yield as the weed biomass increases, the grain yield decreases.

Table 3: Correlation coefficient between weed density, weed biomass, no. of kernels/cob and grain yield of sweet corn

Treatment	Grain yield	Weed density at 40 DAS	Weed density at 60 DAS	Weed biomass at 40 DAS	Weed biomass at 60 DAS	No. kernels/cob
Grain yield	1	-0.971*	-0.987*	-0.983*	-0.986*	0.993*
Weed density at 40 DAS	-0.971*	1	0.994*	0.991*	0.993*	-0.974*
Weed density at 60 DAS	-0.987*	0.994*	1	0.992*	0.997*	-0.986*
Weed biomass at 40 DAS	-0.983*	0.991*	0.992*	1	0.997*	-0.992*
Weed biomass at 60 DAS	-0.986*	0.993*	0.997*	0.997*	1	-0.990*
No. kernels/cob	0.993*	-0.974*	-0.986*	-0.992*	-0.990*	1

**Correlation significant at 0.05 level; DAS- Days after sowing*

From the present investigation, it can be concluded that the lowest weed density and weed biomass was recorded with two hand weeding at 20 and 40 DAS which was closely followed by atrazine @ 1 kg/ha as PE *fb* one hand weeding at 20 DAS and atrazine @ 1 kg/ha as PE *fb* tembotrione @ 0.12 kg/ha as PoE at 20 DAS. These also resulted significantly increased in plant height, plant dry matter, girth of cob, number of kernels/cob and higher grain yield. In general, all of the treated plots with hand weeding, herbicide treatments, or both produced higher yields than untreated check plots.

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