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ORIGINAL ARTICLE

Influence of Weed Management Practices on Growth and Yield of Baby Corn (*Zea mays* L.) under the Temperate conditions of Kashmir Valley

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ABSTRACT

A field experiment on Influence of weed management practices on growth and yield of baby corn (Zea mays L.) was conducted at Mountain Livestock Research Institute (MLRI), Manasbal, (SKUAST-K) during kharif 2014. The experiment comprising of 11 treatments [Farmers practice (W_1); Earthing up and weeding at 30 and 45 DAS (W_2); Atrazine @ 1.5 kg a.i ha^{-1}pre-emergence at 1 DAS (W_3); atrazine @ 1.5 kg a.iha^{-1} early post-emergence at 10 DAS (W_4); straw mulch (paddy straw) at 1DAS (W_5); straw mulch (brown sarson) at 1DAS (W_6); polyethylene mulch (black) at 1DAS (W_7); polyethylene mulch (white) at 1DAS (W_8); saw mulch at 1DAS (W_9); weedy check (W_{10}) and weed free (W_{11})] was laid out in a randomised complete block design with three replications. Significant variation in growth and yield was recorded among the various treatments tested. The treatment W_{11} recorded significantly highest growth parameters viz. dry matter accumulation (118.41 q ha^{-1}) and leaf area index (5.38) but was at par with the treatment W_2 while significantly the lowest dry matter accumulation (92.40 q ha^{-1}) and leaf area index (3.52) were recorded for the treatment W_{10}. The treatment W_{11} recorded significantly highest corn (102.55 q ha^{-1}) and green fodder (355.26 q ha^{-1}) yield while these were significantly lowest in the W_{10} treatment.

***Keywords**: Atrazine, baby corn, temperate, weed management*

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INTRODUCTION

In India, maize (*Zea mays* L.) is grown on an area of 9.43 m ha, with production and productivity of 24.35 m t and 2583 kg^{ha-1}, respectively. Maize has been classified in different types according to its use and/or starch content viz., Flour corn (*Zea mays* var. amylacea) Popcorn (*Zea mays* var. everta) Dent corn (*Zea mays* var. indentata) Flint corn (*Zea mays* var. indurata) Sweet corn (*Zea mays* var. saccharata) Waxy corn (*Zea mays* var. ceratina) Pod corn (*Zea mays* var. tunicate) and Baby corn (*Zea mays* L) [1].

Baby corn (*Zea mays* L.) refers to the whole, entirely edible cobs of immature corn harvested just before fertilization at 2-3 cm long silk emergence stage (Dar *et al*., 2017). Baby corn is a delicious and nutritive vegetable and it is consumed as a natural food. It is very tasty, sweet and easy to consume because of its tenderness and sweetness with good nutritive value. Due to changing food preferences in Indian life style, the urban population is switching over to new food items; the 'Baby corn' is a new addition to Indian foods. Being a short duration crop, it easily fits in an intensive cropping system and in addition to baby cob it provides delicious green fodder to cattle [2].

Weeds are perceived by the farming community as being the greatest cause of yield loss in maize crop. They create a severe crop weed competition and are competing for light, water, nutrients, space, carbon dioxide etc. and increasing the cost of production. Yield losses in the range of 50-60% occur owing to absence of appropriateness, untimely and uncontrolled weed growth in maize fields and therefore needing immediate attention. Manual weeding though very effective in controlling weeds, very often is cumbersome, labour intensive, expensive and time consuming [7]. The use of atrazine herbicide has yielded encouraging results in maize at national and international level. How this herbicide behaves with respect to weed growth and crop growth when applied at different stages of this crop needs to be studied. Different mulches can be exploited for weed control in this crop and the different resources lying with the farming community can be put to use depending upon their availability and suitability. Keeping in view

the above facts, the experiment was undertaken to study the influence of weed management practices on growth and yield of baby corn under temperate conditions.

MATERIAL AND METHODS

The experiment was conducted at Mountain Livestock Research Institute (MLRI) Manasbal, SKUAST-Kashmir during *Kharif* 2014. The site is situated between 34.15°N and 74.40°E at an altitude of 1650 metres above mean sea level. Climatically the experimental site falls in temperate zone of north western Himalaya characterised by hot summers and very cold winters. The average annual precipitation is 944.6 mm (average of past 30 years) most of which is received from December to April in the form of snow and rains. The mean maximum and minimum temperatures were 28.14°C and 12.88°C, respectively and the total precipitation amounted to 389.50 mm during crop growth period of 2014. The total number of sunshine hours recorded during the crop growth period was 144.36 hours and the mean maximum and minimum relative humidity were 79.30% and 53.00%, respectively during the crop growth period. The soil was clay loam in texture, high in organic carbon, low in available nitrogen, medium in available phosphorus and high in available potassium with neutral pH.

The experiment consisting of eleven treatments was laid out in a randomized complete block design with three replications and eleven treatments: Farmers practice (W_1), Earthing up and weeding at 30 DAS and 45 DAS (W_2), Atrazine @ 1.5 kg *a.i* ha^{-1} Pre-emergence at 1 DAS (W_3), Atrazine @ 1.5 kg *a.i* ha^{-1} Early Post-emergence at 10 DAS (W_4), Straw mulch (paddy straw) at 1DAS (W_5), Straw mulch (brown sarson) at 1DAS (W_6), Polyethylene mulch (black) at 1DAS (W_7), Polyethylene mulch (white) at 1DAS (W_8), Saw mulch at 1DAS (W_9), Weedy check (W_{10}) and Weed free (W_{11}). The variety HM-4 was used for the experiment. The gross plot size was 6 m × 3 m and net plot size was 5.40 m × 1.50 m.

Picking of baby corn was done on alternate days at 1-3 days of silking emergence from each net plot by leaving border and penultimate rows. Picking was done carefully, from leaf sheath so that upper stem and lower leaves are not damaged, during morning and evening hours when ambient temperature is low and moisture per cent in the baby corn is at highest. After completion of baby corn pickings, the maize fodder was harvested from each net plot. Plant samples from 50 cm row length in each plot were collected from the penultimate rows at 7 days interval from sowing date upto picking stage. After drying for 5-6 days, the samples were oven dried at 60-65°C to a constant weight. Dry weight of plant samples were recorded in grams and then converted to q ha^{-1}. Leaf area index was recorded at seven days interval by using the instrument canopy analyser. The green fodder harvested from each net plot after completion of pickings was tied in bundles and weighed in kg plot^{-1}.

RESULTS AND DISCUSSION

Growth parameters

Dry matter accumulation

Dry matter accumulation of crop showed significant variation with respect to different weed management practices (Table 1) at seven days interval of the crop growth. Weed free treatment recorded the highest dry matter accumulation of 118.41 q ha^{-1} whereas lowest dry matter accumulation of 92.40 q ha^{-1} was recorded in weedy check that was on par with atrazine @ 1.5 kg *a.i*. ha^{-1} early post-emergence (96.55 q ha^{-1}). Earthing up and weeding at 30 DAS and 45 DAS recorded a dry matter accumulation of 114.0 q ha^{-1} though on par with weed free treatment but showed significant variation when compared with black polyethylene mulch (108.08 q ha^{-1}), white polyethylene mulch (107.89 q ha^{-1}), brown sarson mulch (105.93 q ha^{-1}) and paddy straw mulch (103.12 q ha^{-1}) followed by saw mulch (102.84 q ha^{-1}), farmers practice (102.81 q ha^{-1}) and atrazine @ 1.5 kg *a.i*. ha^{-1} pre-emergence (102.81 q ha^{-1}), (Table 1). This might be due to less competition for light, water, space and nutrients due to the periodical removal of weeds under weed free treatment, which might have maintained high soil fertility status and moisture content by means of less removal of plant nutrients and moisture by weeds. Maximum dry weight of maize under weed-free treatment was also reported by Malviya and Singh [4].

Leaf area index

A perusal of data in Table 2 showed that leaf area index was significantly affected by weed management practices at seven days interval. Results revealed that highest leaf area index (5.38) at harvest was recorded in weed free treatment followed by earthing up and weeding at 30 DAS and 45 DAS with a leaf area index of 5.10 though on par with black polyethylene mulch (4.93) and white polyethylene mulch (4.84) but showed significant variation with respect to brown sarson mulch (4.80) and paddy straw mulch (4.74). Lowest leaf area index (3.52) was recorded by weedy check (3.52). Farmers' practice (4.41), saw mulch (4.47) and atrazine @ 1.5 kg *a.i*. ha^{-1} pre-emergence (4.19) were on par with each other with respect to leaf area index. Black polyethylene mulch (4.93), white polyethylene mulch (4.84) brown

sarson mulch (4.80) and paddy straw mulch (4.74) were on par with each other but showed significant variation with respect to saw mulch (4.47). This might be attributed to severe crop weed competition under weedy check treatment for resources viz; sunlight, moisture and nutrients thereby making maize plants weaker enough to produce more functional leaves. Mahmoodi [3] also reported that the leaf area index of corn was significantly decreased by weed competition in weed infested treatments. These findings are also in close confirmation findings of Sinha *et al*. [6].

Table 1:Effect of weed management practices on dry mater accumulation (q ha^{-1}) of baby corn (*Zea mays* L.) at seven days interval

Interval	15 DAS	22 DAS	29 DAS	36 DAS	43 DAS	50 DAS	57 DAS	64 DAS	71 DAS
Treatments									
Farmers practice	1.22	2.56	18.81	37.16	54.47	69.25	86.85	97.64	102.81
Earthing up and weeding	1.47	3.17	21.41	42.32	61.79	79.01	95.75	108.76	114.00
Atrazine@1.5 kg a.i ha^{-1} PE	1.36	2.92	18.05	37.09	54.13	68.97	86.28	96.90	102.56
Atrazine@1.5 kg a.i ha^{-1} Early PoE	1.46	2.81	16.88	36.84	53.43	68.83	84.67	91.90	96.55
Paddy straw mulch	1.34	2.89	19.31	39.98	56.89	72.09	87.25	99.32	103.12
Brown sarson mulch	1.42	3.07	19.42	40.07	57.07	72.27	89.88	101.22	105.93
Black polyethylene mulch	1.45	3.13	21.25	41.81	58.47	74.96	91.69	103.42	108.08
White polyethylene mulch	1.47	3.15	19.58	40.21	57.60	72.92	90.34	102.90	107.89
Saw mulch	1.38	3.09	18.88	39.61	56.84	70.93	87.04	98.34	102.84
Weedy check	1.35	2.97	16.75	33.36	47.60	64.04	79.21	86.91	92.40
Weed free	1.46	3.28	21.42	44.46	64.34	81.25	99.59	113.8	118.41
SEm±	0.25	0.17	0.28	0.61	0.65	0.55	1.58	1.17	1.62
C.D (p≤0.05)	NS	0.51	0.83	1.80	1.94	1.72	4.68	3.58	4.83

Table 2:Effect of weed management practices on leaf area index of baby corn (*Zea mays* L.) at seven days interval

Interval Treatments	15 DAS	22 DAS	29 DAS	36 DAS	43 DAS	50 DAS	57 DAS	64 DAS	71 DAS
Farmers practice	0.14	0.34	1.09	2.07	2.83	4.10	5.07	4.84	4.41
Earthingup and weeding	0.15	0.37	1.36	2.60	3.60	4.67	6.16	5.73	5.10
Atrazine @ 1.5 kg a.i ha^{-1} PE	0.12	0.31	1.04	1.93	2.78	3.96	4.91	4.62	4.19
Atrazine @1.5 kg a.i ha^{-1} Early PoE	0.13	0.28	0.97	1.84	2.63	3.84	4.66	4.30	3.99
Paddy straw mulch	0.12	0.35	1.22	2.33	3.09	4.37	5.60	5.16	4.74
Brown sarson mulch	0.13	0.36	1.27	2.43	3.19	4.40	5.80	5.37	4.80
Black polyethylene mulch	0.15	0.37	1.33	2.58	3.49	4.54	6.03	5.74	4.93
White polyethylene mulch	0.14	0.36	1.31	2.52	3.40	4.43	5.87	5.65	4.85
Saw mulch	0.13	0.35	1.18	2.24	2.94	4.22	5.45	5.03	4.47
Weedy check	0.11	0.22	0.80	1.44	2.28	3.14	4.23	3.96	3.52
Weed free	0.16	0.39	1.54	2.85	3.91	4.98	6.51	5.98	5.38
SEm±	0.03	0.05	0.06	0.07	0.08	0.09	0.10	0.07	0.08
C.D (p≤0.05)	0.08	0.15	0.17	0.22	0.25	0.29	0.30	0.21	0.24

Table 3: Effect of weed management practices on cob yield with and without husk (q ha^{-1}), husk baby corn ratio and green fodder yield (q ha^{-1}) of Baby corn (*Zea mays* L.)

Treatments	Cob yield with husk q ha^{-1})	Cob yield without husk (q ha^{-1})	Husk baby corn ratio	Green fodder yield (q ha^{-1})
Farmers practice	91.36	17.26	5.29	323.64
Earthingup and weeding	98.59	19.46	5.07	345.73
Atrazine @ 1.5 kg a.i ha^{-1} PE	88.04	16.62	5.29	319.60
Atrazine @1.5 kg a.i ha^{-1} Early PoE	87.53	15.36	5.69	311.54
Paddy straw mulch	96.61	18.04	5.35	329.83
Brown sarson mulch	96.83	18.19	5.32	330.51
Black polyethylene mulch	97.81	19.24	5.08	338.20
White polyethylene mulch	97.08	19.03	5.10	336.95
Saw mulch	92.17	17.41	5.29	328.07
Weedy check	73.90	13.60	5.43	290.99
Weed free	102.55	20.09	5.10	355.26
SEm±	0.88	0.27	0.26	6.02
C.D (p≤0.05)	2.61	0.80	0.89	18.24

Yield

Highest baby corn yield with and without husk, green fodder yield with and without husk were significantly higher in weed free treatment whereas lowest value was observed in weedy check. Highest husk baby corn ratio was observed in Atrazine @ 1.5 kg *a.i* ha^{-1} early post-emergence treatment followed by weedy check, whereas, the lowest husk baby corn ratio was recorded by earthing up and weeding at 30 DAS and 45 DAS. The improved yield under these treatments might be due to continuous removal of weeds under weed free treatment which might have maintained high soil fertility status and moisture content by means of less removal of plant nutrients and moisture by weeds (Table 3). Pandey *et al.* [5] reported all the weed control treatment improved baby corn yield and green fodder yield significantly and enhanced monetary returns compared with weedy check. The highest baby corn yield and green fodder yield were recorded under weed free treatment (Table 3). These findings are also in close confirmation with those reported by Sinha *et al*. [6].

CONCLUSION

Weed free treatment had a significant effect on the growth and yield of baby corn. Thus the results of the study lead to the conclusion that to realize higher baby corn yield, earthing up and hand weeding at 30 and 45 days after sowing is recommended under temperate conditions of Kashmir valley,.

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