



RESEARCH NOTE

Effect of integrated weed management methods on weeds and productivity of summer baby corn

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ABSTRACT

A field experiment was carried out at Instructional-cum-Research Farm, Assam Agricultural University, Jorhat during summer 2023 to study the effects of weed management treatments on growth, yield and economics of baby corn. Ten weed management treatments were tested in randomized block design with three replications. Different weed management treatments significantly influenced the weed density and biomass, growth, yield attributes and yield of baby corn. Application of paddy straw mulching 4 t/ha at 1 day after seeding (DAS) followed by (*fb*) earthing-up and weeding at 25 DAS recorded the highest baby corn weight without husk (13.74 g) and cob yield without husk (1.91 t/ha) and green fodder yield (29.32 t/ha). Pre-emergence application (PE) of metribuzin 1.0 kg/ha *fb* hand weeding at 25 DAS recorded the next best cob yield without husk (1.86 t/ha) and green fodder yield (28.72 t/ha) with the highest net return of ₹ 1,64,000/ha and B-C ratio of 3.32 due to low cultivation cost compared to the paddy straw mulching 4 t/ha 1 DAS *fb* earthing-up and weeding at 25 DAS.

Keywords: Baby corn, mulching, herbicide, integrated weed management, weed index

Baby corn (*Zea mays* L.) is the young ear of maize harvested before or just after silk emergence, before fertilization. The de-husked ears, valued for their sweet flavour and crispiness, are consumed as a vegetable. Cultivation of baby corn provides tremendous opportunities for crop diversification, crop intensification, value addition and revenue generation. Weeds are perceived by the farming community as being the greatest cause of yield loss in maize. Yield losses in the range of 50-60% occur owing to the absence of appropriateness, untimely and uncontrolled weed growth in maize fields, and therefore, need immediate attention (Ramesh *et al.* 2017). Manual weeding though very effective in controlling weeds, very often is cumbersome, labour-intensive, expensive and time consuming (Warade *et al.* 2006). Baby corn, being an exhaustive feeder, is generally fertilized heavily and spaced widely, both providing an opportunity for weed infestation which results in a drastic reduction in crop yield. Moreover, slow crop growth at early stage along with frequent irrigation causes the season-long weed infestation and yield reduction by 44% in baby corn (Mandal *et al.* 2004). Systematic development of integrated weed-

management strategies is very important to achieve higher crop production (Rao and Nagamani 2010). The use of herbicides like atrazine, metribuzin has resulted encouraging results in maize. Different mulches can be exploited for weed control in this crop and the different resources lying with the farming community can be used depending upon their availability and suitability. The effects of various weed management practices such as herbicides, mulches on weed growth, and growth and yield of baby corn need to be studied for maximization of baby corn yield by minimizing the weed competition for growth resources. Thus, a field experiment was conducted to assess the effects of various integrated weed management treatments on weeds and productivity of baby corn.

The field experiment was conducted at the Instructional-cum-Research (ICR) Farm, Assam Agricultural University, Jorhat. The farm is situated at 26°45' N latitude and 94°12' E longitude with an altitude of 86.56 meters above the mean sea level. The soil texture of the experimental site was sandy loam, low in available N (262.93 kg/ha), medium in available P (27.48 kg/ha) and medium in available K (147.94 kg/ha) and medium in organic carbon content (0.52 %). The total rainfall received during the crop growing period was 263.80 mm. The 'baby corn'

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hybrid G-5414 was sown on 21 February 2023 with the seed rate 22.5 kg/ha and row to row spacing of 45 cm and plant to plant spacing of 20 cm. Recommended dose of fertilizer (N-P-K 120-60-60 kg/ha) was applied and the full doses of P and K and half dose of nitrogenous fertilizers were applied one day before sowing. The rest of the nitrogenous fertilizers were top dressed during knee-high stage (30 DAS). The first picking of baby corn was done on 21 April 2023 (59 DAS) and subsequent picking continued till 7 May 2023. The experiment consisting of ten weed management treatments was laid out in a randomized block design with three replications. The treatment details are given in **Table 1**. The population of weeds (weed density) was counted at 20, 40 and 60 DAS using a 0.5 m x 0.5 m quadrat and the dry matter of weed (weed biomass) was recorded after drying them in hot air oven at 65 °C till constant dry weight was achieved. The weed density and biomass data were subjected to square root transformation before statistical analysis. Weed control efficiency (WCE), weed control index (WCI) and weed index (WI) were calculated as per the formula given by Sharma (2015).

WEC (%) = $\frac{\text{Weed density in control plot} - \text{weed density in treated plot} \times 100}{\text{weed density in control plot}}$

WCI (%) = $\frac{\text{Weed biomass in control plot} - \text{weed biomass in treated plot} \times 100}{\text{weed biomass in control plot}}$

WI (%) = $\frac{\text{Yield from weed free plot} - \text{yield from treated plot} \times 100}{\text{Yield from weed free plot}}$

Effect on weeds

The mixed weed flora, in the experimental field, comprised of a diverse and competitive weed community including grassy, sedge, and broad-leaved weed species. The dominant grassy weeds were: *Cynodon dactylon*, *Digitaria ciliaris*, *Echinochloa colona*, *Eleusine indica*, and *Paspalum conjugatum*. Only sedge was *Cyperus rotundus*. Among the broad-leaved weeds, *Ageratum houstonianum*, *Alternanthera philoxeroides*, *Oxalis martiana*, and *Polygonum plebeium* were common.

All the weed management treatments significantly reduced the weed density at 20 days interval compared to the weedy check (**Table 1**). At 20 DAS, significantly higher reduction in weed density and weed biomass was recorded with metribuzin 2.0 kg/ha which was found at par with application of paddy straw mulching 4t/ha 1 DAS. At 40 DAS, significantly higher reduction (74%) in weed density was recorded with paddy straw mulching 4t/ha at 1DAS *fb* earthing up and weeding at 25 DAS, compared to the weedy check. The weed density recorded with paddy straw mulching 4t/ha at 1DAS *fb* earthing-up and weeding at 25 DAS was found at par with the treatments involving metribuzin 1.0 kg/ha PE *fb* hand-weeding at 25 DAS; earthing-up and weeding at 25 DAS; and with metribuzin 1.0 kg/ha PE *fb* tembotrione 120 g/ha PoE 25 DAS. At 60 DAS, metribuzin 1.0 kg/ha PE *fb* hand-weeding at 40 DAS

Table 1. Effect of weed management treatments on weed density and biomass, WCE, WCI and WI in baby corn

Treatment	Weed density (no./m ²)*			Weed biomass (g/m ²)			WCE (%)	WCI (%)	WI (%)
	20 DAS	40 DAS	60 DAS	20 DAS	40 DAS	60 DAS	60 DAS	60 DAS	
Earthing-up and weeding at 25 DAS	11.21 (125.3)	5.75 (32.7)	7.51 (56.0)	4.45 (19.3)	2.21 (4.4)	3.84 (14.3)	89.45	85.59	18.87
Paddy straw mulching 4 t/ha at 1 DAS	6.67 (44.0)	10.79 (116.0)	11.9 (142.7)	2.71 (6.8)	4.17 (16.9)	4.95 (24.1)	73.12	75.70	19.71
Paddy straw mulching 4 t/ha 1 DAS <i>fb</i> earthing-up and weeding at 25 DAS	6.96 (48.0)	5.69 (32.00)	6.41 (40.7)	2.96 (8.4)	2.17 (4.24)	2.73 (6.9)	92.34	92.99	-0.86
Atrazine 1.0 kg /ha PE	7.06 (49.3)	9.44 (88.67)	12.45 (154.6)	3.02 (8.7)	3.77 (13.8)	5.11 (25.6)	70.85	74.13	21.44
Metribuzin 2.0 kg/ha PE	5.69 (32.0)	7.24 (52.00)	11.96 (142.6)	2.17 (4.2)	3.37 (10.9)	4.78 (22.4)	73.12	77.34	24.97
Metribuzin 1.0 kg/ha PE <i>fb</i> hand-weeding at 25 DAS	7.29 (52.7)	5.87 (34.00)	6.72 (44.7)	3.37 (11.0)	2.08 (3.8)	2.93 (8.1)	91.58	91.89	1.81
Metribuzin 1.0 kg/ha PE <i>fb</i> hand-weeding at 40 DAS	7.24 (52.0)	9.26 (85.33)	6.26 (38.7)	3.33 (10.7)	3.96 (15.3)	2.61 (6.3)	92.71	93.62	8.02
Metribuzin 1.0 kg/ha PE <i>fb</i> tembotrione 120 g/ha PoE at 25 DAS	7.34 (53.3)	5.99 (35.33)	6.87 (46.7)	3.40 (11.2)	2.29 (4.7)	2.92 (8.0)	91.21	91.82	2.32
Control - weedy check	11.91 (141.3)	21.91 (480.0)	23.04 (530.6)	4.85 (23.1)	9.05 (81.5)	9.97 (99.1)	-	-	41.32
Weed free	0.71 (0.0)	0.71 (0.0)	0.71 (0.0)	0.71 (0.0)	0.71 (0.0)	0.71 (0.0)	100.00	100.00	0.00
LSD (p=0.05)	1.18	1.33	1.48	0.61	0.90	1.02	-	-	-

*DAS: days after sowing, *fb*: followed by, PE: pre-emergence application; PoE: post-emergence application; WCE: weed control efficiency, WCI: weed control index, WI: weed index; Transformed values are presented, with figures in parentheses indicating the original values

Table 2. Effect of weed management treatments on baby corn growth, yield attributes and yield and economics of baby corn

Treatment	Plant height at harvest (cm)	LAI at 60 DAS	Cob length without husk (cm)	Cob weight without husk (g)	No. of cob/plant	Cob yield with husk (t/ha)	Cob yield without husk (t/ha)	Green forage yield (t/ha)	Net returns (x10 ³ Rs/ha)	B:C Ratio
Earthing-up and weeding at 25 DAS	132.96	4.29	9.84	10.42	2.44	7.67	1.46	23.15	122.57	2.65
Paddy straw mulching 4 t/ha at 1 DAS	131.21	4.27	9.42	10.85	2.56	7.54	1.43	22.38	103.66	1.69
Paddy straw mulching 4 t/ha 1 DAS <i>fb</i> earthing-up and weeding at 25 DAS	146.50	5.64	11.24	13.74	2.78	9.53	1.91	29.32	156.40	2.45
Atrazine 1.0 kg/ha PE	123.73	4.45	9.45	10.27	2.18	7.38	1.31	21.89	107.37	2.34
Metribuzin 2.0 kg/ha PE	117.40	4.04	9.09	9.67	2.16	7.03	1.28	21.60	96.89	1.83
Metribuzin 1.0 kg/ha PE <i>fb</i> hand-weeding at 25 DAS	138.98	5.49	10.92	12.53	2.78	9.28	1.86	28.72	164.81	3.32
Metribuzin 1.0 kg/ha PE <i>fb</i> tembotrione 120 g/ha PoE at 25 DAS	132.93	4.90	10.58	11.57	2.42	8.67	1.64	26.04	150.48	3.02
Metribuzin 1.0 kg/ha PE <i>fb</i> tembotrione 120 g/ha PoE at 25 DAS	137.58	5.13	10.85	12.13	2.67	9.23	1.80	28.53	158.08	3.11
Control - weedy check	115.55	3.42	8.43	8.65	2.04	5.45	0.96	20.26	72.02	1.62
Weed free	140.54	5.53	11.06	13.20	2.78	9.45	1.87	28.90	158.70	2.77
LSD (p=0.05)	13.39	1.03	1.16	1.76	0.56	1.73	0.26	3.27	-	-

*DAS: days after sowing, *fb*: followed by, PE: pre-emergence application; PoE: post-emergence application

recorded significantly lower weed density, which was found at par with paddy straw mulching 4t/ha at 1DAS. Next effective treatments were paddy straw mulching 4t/ha at 1DAS *fb* earthing-up and weeding at 25 DAS; metribuzin 1.0 kg/ha PE *fb* hand-weeding at 25 DAS and metribuzin 1.0 kg/ha PE *fb* tembotrione 120 g/ha PoE at 25 DAS. The lowest weed biomass and weed control efficiency at 40 DAS and 60 DAS was recorded with metribuzin 1.0 kg/ha PE *fb* hand-weeding at 25 DAS which was found at par with paddy straw mulching 4t/ha at 1DAS *fb* earthing-up and weeding at 25 DAS; metribuzin 1.0 kg/ha PE *fb* hand-weeding at 25 DAS; metribuzin 1.0 kg/ha PE *fb* tembotrione 120 g/ha PoE at 25DAS; and earthing-up and weeding at 25 DAS. The herbicides efficiently managed weeds in the initial stages and the second flush were managed by herbicide or non-chemical method and hence resulted in lesser weed density and biomass in the treatments with the them as components. The initial mulching with paddy straw 4 t/ha at 1DAS *fb* earthing-up and weeding at 25 DAS had a smothering effect on weeds and thereby exhibited lower emergence of weeds at early stages while hand weeding and earthing-up at 25 DAS managed the second flush of weeds which resulted in lower weed density and biomass at 40 and 60 DAS. The reduction in weed density and biomass at critical crop weed competition stage created congenial environment for vigorous baby corn growth and later the crop itself had a smothering effect on weeds grown in the vicinity. The results were in agreement with Mahadevaiah *et al.* (2010), Abdullahi *et al.* (2016), Mishra *et al.* (2016) and Prithwiraj *et al.* (2018). The sole application of atrazine 1.0 kg/ha PE and metribuzin 2.0 kg/ha PE were less effective in

managing weeds as the weeds emerged at later stage of baby corn growth and were remained uncontrolled with these treatments. The results are in the lines of Kandasamy (2017). At 20 DAS, the highest WCI was recorded with metribuzin 2.0 kg/ha PE which was found at par with paddy straw mulching 4 t/ha at 1 DAS. At 40 DAS and 60 DAS, the highest WCI was recorded with 1.0 kg/ha PE *fb* hand-weeding at 25 DAS.

Effect on baby corn

The different weed management treatments significantly enhanced growth parameters as compared to the weedy check (**Table 2**). The tallest plants with highest LAI were recorded with paddy straw mulching at 1 DAS (4t/ha) *fb* earthing-up and weeding at 25 DAS which was found at par with the weed free; metribuzin 1.0 kg/ha PE *fb* hand-weeding at 25 DAS and metribuzin 1.0 kg/ha PE *fb* tembotrione 120 g/ha PoE at 25DAS. This might be attributed to lower weed density and biomass under these treatments that created less crop weed competition for growth factors. Similarly, all the weed management treatments improved the yield attributes of baby corn as compared to the weedy check. The treatment with paddy straw mulching 4t/ha at 1 DAS *fb* earthing-up and weeding at 25 DAS recorded the highest yield attributes of baby corn, *viz.* cob length and cob weight, the highest cob yield without husk which was 98.96 % higher over the weedy check and 2.14% higher over the weed free cob yield. The results are in conformity of the findings of Mandal *et al.* (2004). The best treatment was found at par with metribuzin 1.0 kg/ha PE *fb* hand-weeding at 25 DAS and metribuzin 1.0 kg/ha PE *fb* tembotrione 120 g/ha

PoE at 25DAS. The results corroborate with the findings of Abdullahi *et al.* (2016), Dutta *et al.* (2016) and Mandal *et al.* (2004).

It was concluded that paddy straw mulching 4t/ha at 1DAS *fb* earthing-up and weeding at 25 DAS resulted in effective management of weeds as well as the highest cob yield without husk and green fodder yield of baby corn. Metribuzin 1.0 kg/ha PE *fb* hand weeding at 25 DAS recorded the next best cob yield without husk and green fodder yield with the highest net return of ₹ 1,64, 000/ha and B-C ratio of 3.32 due to lower cost of cultivation with this treatment compared to the other high yielding treatments.

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