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Effect of seeding method and herbicide on weeds, and growth and yield of wheat (*Triticum aestivum*)

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ABSTRACT

A field experiment was conducted during the winter seasons of 1988–89 and 1989–90 at Jorhat, to evaluate effectual method of seeding and herbicide for controlling weeds and increasing yield of wheat (*Triticum aestivum* L. emend. Fiori & Paol). Line-sowing and cross-sowing showed equal advantage over broadcast method for higher grain yield. Isoproturon @ 0.75 kg/ha and 2,4-D @ 0.8 kg/ha were equally effective in controlling weeds and improving the growth and yield components as well as grain yield of wheat, which were comparable with hand-weeding system.

Method of seeding adopted has got certain impact on weed growth. Broadcasting, a common method of seeding wheat (*Triticum aestivum* L. emend. Fiori & Paol.) in Assam, encourages weed growth and makes impossible to control weed manualy or mechanically. In broadcast-sown crop, besides intra-crop competition, weed–crop competition for nutrients, moisture, solar radiation and space is also severe which ultimately leads to poor crop growth and yield. In wheat yield loss due to weeds ranges from 7 to 50%, depending on weed intensity (Gill, 1979). Herbicides can be used for effective and economic weed control in wheat, irrespective of seeding method adopted. The present investigation was therefore conducted to find out competent seeding method and herbicide for nullifying weed interference and increasing wheat yield.

MATERIALS AND METHODS

The field experiment was carried out during winter seasons of 1988–89 and 1989–90 at Jorhat on a sandy-loam soil (pH 5.8). It had organic carbon 0.69%, total N 0.14%, available P_2O_5 14.5 kg/ha and available K_2O 43.4 kg/ha. The treatments tested in split-plot design with 4 replications, consisted of 3 seeding methods (line sowing, cross-sowing and broadcasting) as main plots and 4 weed-control measures (isoproturon @ 0.75 kg/ha, 2,4-D @ 0.8 kg/ha, hand-weeding and weedy condition) as subplots. Hand-weeding and application of herbicides as post-emergence were done at 25 days after seeding. 'Sonalika' wheat sown @ 100 kg/ha during the first week of November received 40 kg N, 20 kg P_2O_5 and 20 kg K_2O/ha at sowing. In line sowing seeds were sown in 1 direction maintaining 20 cm row-to-row distance, while in cross-sowing half of the seed was sown in 1 direction and remaining half in the opposite direction, maintaining 20 cm space between rows in both the directions. Observations on weeds and crop were recorded at 70 days after seeding and at harvest respectively.

Table 1. Population and dry matter of weeds and growth and yield of wheat as affected by different treatments

Treatment	Weed population/ m^2		Weed dry matter (g/m^2)		Tillers/ m^2		Grains/ panicle		1,000-grain weight (g)		Grains yield (q/ha)		
	A	B	A	B	A	B	A	B	A	B	A	B	Pooled
Seeding method													
Line sowing	5.8 (34.1)	6.9 (48.5)	24.2	24.5	332.8	353.0	35.4	37.2	32.1	30.9	8.97	9.36	9.17
Cross-sowing	6.0 (35.8)	7.0 (50.0)	20.9	23.8	318.0	333.0	32.5	34.6	31.6	32.0	8.81	9.51	9.16
Broadcasting	5.9 (34.4)	7.4 (54.4)	19.6	24.7	236.5	267.0	28.1	29.5	27.9	27.8	7.50	8.61	8.06
CD (P = 0.05)	NS	0.3	NS	NS	16.0	23.2	2.4	2.7	2.0	1.8	0.24	0.61	0.49
Weed control													
Isoproturon @ 0.75 kg/ha	5.9 (35.0)	7.1 (50.6)	22.8	25.3	301.7	327.0	32.4	34.9	31.6	30.8	9.58	9.61	9.60
2,4-D @ 0.8 kg/ha	5.8 (34.8)	6.9 (47.8)	23.3	24.6	298.0	317.3	32.8	34.5	30.8	31.0	8.88	9.50	9.19
Hand-weeding	5.8 (34.7)	6.1 (38.7)	15.6	17.7	330.0	348.0	35.2	36.0	31.4	31.1	8.63	10.15	9.39
Weedy	5.7 (34.5)	8.3 (67.2)	25.0	29.4	253.3	278.3	27.7	30.0	28.1	28.0	6.62	7.38	7.00
CD (P = 0.05)	NS	0.8	6.3	3.2	17.6	25.1	2.9	3.0	2.2	1.9	0.24	0.58	0.52

A, 1988–89; B, 1989–90
Data in parentheses are original values

Weed-count data were subjected to square-root transformation before statistical analysis.

RESULTS AND DISCUSSION

Weed flora

The weed species of the experimental field were: *Setaria glauca* (L.) Beauv., *Cynodon dactylon* (L.) Pers., *Eleusine indica* (L.) Gaertn., *Echinochloa colona* (L.) Link and *Cyperus iria* L. among narrow-leaf weeds; and *Chenopodium album* L., *Polygonum hydropiper* L., *Amaranthus viridis* L., *Phyllanthus niruri* L., *Borreria hispida* (L.) K. Schum. and *Ageratum conyzoides* L. among broad-leaf weeds.

Effect of seeding method

The seeding methods did not exert substantial effect on weed growth except during 1989–90, wherein line sowing and cross-sowing caused significant reduction in weed population than broadcasting (Table 1). This finding corroborates the results of Johri and Singh (1991), but they recorded significant influence on growth and yield attributes and grain yield of wheat during both the years. Being at par, line sowing and cross-sowing significantly increased tillers/m^2, grains/panicle, 1,000-grain weight and grain yield over broadcasting. The poor performance of the broadcast-sown crop could be attributed to severe intra-crop competition for essential inputs. The results are also congruous with those reported by Jain *et al.* (1989) and Prasad *et al.* (1991).

Effect of weed-control

Hand-weeding was most effective in reducing weed population and their dry-matter accumulation compared with the other treatments (Table 1). The post-emergence application of isoproturon and 2,4-D being at par caused significantly reduced the weed population and dry weight during 1989–90 compared with weedy check. The effectiveness of post-emergent isoproturon and 2,4-D was also reported by Singh *et al.* (1991). These 2 herbicides showed in significantly higher values for growth and yield attributes and thus significantly higher grain yield of wheat than the unweeded control in both the years. This confirms the findings of Malik *et al.* (1992). However, the relative increase in yield was more with isoproturon than with 2,4-D. This is in conformity with the results of Walia *et al.* (1990).

Thus line sowing and isoproturon or 2,4-D may be an alternative to broadcasting seeds and hand-weeding, the common practices being followed in wheat cultivation in Assam, respectively for sustained crop production.

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