

## Herbicidal Weed Management in Soyabean

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### Abstract

A field experiment was conducted during the kharif season of 2000 to study the effect of different herbicides on weed control in soyabean (Bragg). It was observed that imazethapyr (pursuit) at 100 g ai/hectare gave the best control of sedges and broad leaved weeds with the lowest weed dry matter of 1.3 and 4.9 g/m<sup>2</sup> at 40 DAS and dimethenamid-P (Frontier) at 1100 g ai/hectare effected the best grassy weed control with the lowest weed dry matter (1 g/m<sup>2</sup>) at 40 DAS. The highest over all WCE (78.8%) at 40 DAS recorded with the treatment imazethapyr (100 g ai/hectare). Tankmix of bentazon+dimethenamid-P+ammonium nitrate showed phytotoxicity and gave poor yield (1,134 kg/hectare). WCE and soyabean seed yield were found to be positively correlated and imazethapyr at 100 g ai/hectare produced the highest seed yield (2172 kg/hectare) followed by fluchloralin at 960 g ai/hectare giving 2,132 kg/hectare of seed yield. The lowest seed yield (986 kg/hectare) was obtained with the unweeded control treatment.

Soyabean does not require introduction any more as it is well known pulse and oil seed crop throughout the world in general and India in particular. India would need 23 million tonnes of pulse by the year 2020 (with a 3.3% increase in annual demand) as compared to its present production of mere 15 million tonnes. So productivity has to be increased by two folds at the national level as there is little scope of horizontal expansion of area under pulses (1). Tremendous competition from weeds in soyabean is one of the major obstacles to increase its productivity. The mechanical method of weed control in vogue has proved to be a futile exercise as it involves huge cost on manual laborers. Hence, the cheaper herbicidal method of weed management could be an alternative choice for soyabean

(2). This hypothesis put on the track to conduct the present experiment on herbicidal weed management in soyabean to find out suitable herbicide solely or in combination for higher productivity in the southern plains of West Bengal.

### Methods

The experiment was conducted at the Teaching Farm (23° N, 89° E, 9.75 m AMSL), Mondouri, BCKV during the kharif season 2000. The experiment was laid out in a randomized block design (RBD) with 14 treatments and three replications and the net size of each plot was 6m × 4 m. The herbicides included in this experiment were tepralox dim (aramo) at 50, 75 and 100 g ai/hectare; dimethenamid-P (Frontier) at 850 and 1,100 g ai/hectare; dimethenamid-P is the optically active isomer of racemic formulation of dimethenamid (optically inactive). Dimethenamid-P is more active as compared to dimethenamid.

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Table 1. Effect of different herbicide treatments on total dry weight of weeds (g/m<sup>2</sup>) and weed control efficiency (%). TM, Tankmix ; fb, followed by ; DAS, days after sowing.

Treatment	Dose (g ai/ ha)	Dry weight of weeds (g/m <sup>2</sup> )									WCE (%) at 40 DAS
		10 DAS			20 DAS			40 DAS			
		BL	Sed- ges	Gr- ass	BL	Sed- ges	Gr- ass	BL	Sed- ges	Gr- ass	
Tepraloxymid	50	11.8	3.8	3.0	9.6	3.5	2.3	10.3	3.1	2.4	59.3
Tepraloxymid	75	11.9	3.8	2.9	9.7	3.1	2.1	9.7	3.0	2.0	62.2
Tepraloxymid	100	12.6	3.8	2.8	8.9	2.9	2.1	9.1	2.9	2.1	63.9
Dimethenamid-P	850	9.1	3.0	1.8	9.4	2.8	1.2	9.3	3.1	1.1	65.4
Dimethenamid-P	1100	9.0	2.6	1.6	9.3	2.8	1.1	9.0	2.6	1.0	67.4
Bentazon	960	12.0	2.5	2.7	7.5	2.6	2.1	6.9	2.5	2.0	70.6
Bentazon	1200	11.9	2.8	2.6	7.1	2.5	2.2	6.4	2.4	2.1	71.8
Bentazon + Tepraloxymid											
+ Amo. Nitrate (TM)	960+75+ 3kg	12.9	3.8	2.1	11.1	3.0	2.0	9.2	2.7	2.0	64.4
-Do-	1200+75 +3kg	12.8	3.4	2.0	9.8	3.2	1.9	10.0	2.8	2.5	60.7
Bentazon + Tepraloxymid (TM)	1200+75	12.2	3.9	2.6	7.8	2.4	2.2	7.4	2.2	1.8	70.5
Dimethena- mid-P fb bentazon	850 fb 1200	8.3	2.1	2.4	7.1	2.7	2.4	7.7	2.1	2.3	68.6
Fluchloralin	960	6.4	2.0	1.7	6.4	2.4	1.2	5.3	2.5	1.0	77.5
Imazethapyr	100	6.5	1.2	2.0	5.9	2.0	2.0	4.9	1.3	2.1	78.8
Unweeded control		12.9	3.9	2.9	21.5	7.9	6.3	23.2	8.1	7.6	
CD at 5%		0.18	0.16	0.07	0.39	0.11	0.06	0.24	0.11	0.08	

amid and required 30–40% less in amount (3). Bentazon (basagran) at 960 and 1,200 g/ha, fluchloralin (basalin) at 960 g ai/ha, Imazethapyr (pursuit) at 100g ai/ha and their combinations. The soyabean variety used was Bragg (Jackson VII × D 49). Weed population and dry weight of weeds were recorded at 10, 20 and 40 days after sowing (DAS). The seed yield of soyabean was recorded at harvest (115 DAS).

## Results and Discussion

### Weed Flora Present

Every category of weeds namely, grass, broadleaved and sedges were found in the experimental plots. Among the different broad-

leaved weeds *Enhydra fluctunes* and *Digera arvens* were the most predominant flora. *Echinochloa colona* was the most competitive grassy weed and the most obnoxious sedge weed was *Cyperus rotundus* in the field. Besides these, *Amaranthus* spp., *Cassia tora*, *Cynodon dactylon*, *Crotou sparciflorus*, and *Blechnelia latifolia* were also found with lesser competitiveness.

### Effects on Weeds

It had been observed that among the different herbicides tested, imazethapyr (pursuit) at 100 g ai/ha gave better weed control particularly the broad leaved weeds and sedges (Table 1). At 40 DAS, the dry weight of

weeds were the lowest for broad leaved (4.9 g/m<sup>2</sup>) and sedges (1.3 g/m<sup>2</sup>) where imazethapyr was applied at 100 g ai/hectare. It was also recorded that the highest weed control efficiency (WCE) to the tune of 50.9, 72.4 and 78.8% was obtained at 10, 20 and 40 DAS respectively in imazethapyr treated plots (Table 1). It was earlier reported that imazethapyr at 50—100 g ai/hectare provides moderate to excellent weed control of a wide range of weeds infesting soyabean (4). Fluchloralin at 960 g ai/hectare provided second highest WCE of 48.9, 72.2 and 77.5% at 10, 20 and 40 DAS respectively for all categories of weeds. Earlier findings also reported that fluchloralin gave effective method of weed control in soyabean grown in the plans of West Bengal (5).

Further, dimethenamid-P (frontier) at 1,100 g ai/hectare gave the lowest dry weight of grassy weeds (without affecting broadleaved and sedge weeds) to the tune of 1.6, 1.1 and 1.0 g/m<sup>2</sup> at 10, 20 and 40 DAS respectively. Dimethenamid-P at 850 g ai/hectare also provided good control of the grassy weeds associated with soyabean. Earlier work (6) supports the observation and reported that it can control the late season flashes of grass through residual activity. Bentazon (basagran) at 1,200 g ai/hectare showed satisfactory over all WCE of 67 and 71.8% at 20 and 40 DAS respectively as compared to other herbicides excluding imazethapyr and fluchloralin. Similar reports was earlier published (7) for peninsular India.

#### Effect on Yield of Soyabean

Seed yield of soyabean was found to be positively correlated with the WCE. So, as the highest WCE (78.8%) was recorded in imazethapyr at 100 g ai/hectare treated plots the highest yield (2,172 kg/hectare) was also

Table 2. Effect of different herbicide treatments on seed yield of soyabean (kg/ha). TM, Tankmix; fb, followed by.

Treatments	Dose (g ai/ha)	Seed yield (kg/ha)	% Increase over control
Tepraloxydim	50	1595	61.8
Tepraloxydim	75	1759	78.4
Tepraloxydim	100	1798	82.4
Dimethenamid-P	850	1825	85.1
Dimethenamid-P	1100	1850	87.6
Bentazon	960	1912	93.9
Bentazon	1200	1957	98.5
Bentazon+Tepraloxydim+Amo. Nitrate (TM)	960+75+3 kg	1268	28.6
-Do-	1200+75+3 kg	1134	15.0
Bentazon+Tepraloxydim (TM)	1200+75	1345	36.4
Dimethenamid-P fb	850 fb	1200	1485
Bentazon	960	2132	116.2
Fluchloralin	100	2172	120.3
Imazethapyr		986	
Unweeded control		35	
CD at 5%			

obtained with this treatment followed by fluchloralin at 960 g ai/hectare producing 2,132 kg/hectare of seed yield (Table 2). It was earlier reported (2) that fluchloralin gave the highest soyabean seed yield in other region of India. Bentazon at 1,200 g ai/hectare recorded 71.8% WCE (at 40 DAS) and produced 1,957 kg/hectare of soyabean seed yield which ranked third after imazethapyr and fluchloralin. It was also observed that bentazon at 1.5 kg ai/hectare provided the highest seed yield in Madhya Pradesh (7). Unweeded control treatment on the other hand produced the lowest seed yield (986 kg/hectare) of soyabean (Table 2).

### Phytotoxicity on Soyabean Plant

Tankmix (TM) of bentazon (1,200 g ai) + dimethenamid-P (75 g ai) + ammonium nitrate (3 kg)/hectare showed phytotoxicity symptoms 2–3 days after its application leading to subsequent stunted growth and less branching of soyabean plant which ultimately reduced the yield (1,134 kg/hectare). This treatment was followed by TM of bentazone (960 g ai) + dimethenamid-P (75 g ai) + ammonium nitrate (3 kg)/hectare which also showed phytotoxic symptoms to a lesser extent resulting lower yield (1,345 kg/hectare). Further, bentazone 960 and 1,200 g ai/hectare though showed phytotoxic symptoms to some extent, this symptoms however, disappeared after about 7–10 days causing fresh regrowth of branches which again provided medium seed yield (1,912–2,367 kg/hectare).

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