

EFFICACY EVALUATION OF DIFFERENT DOSES OF TRIAFAMONE IN DIRECT SEED RICE

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KEYWORDS

Triafamone
Weed control
efficiency
Weed density

Received on :
29.01.2021

Accepted on :
11.10.2021

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ABSTRACT

Experiments was conducted at Indira Gandhi Krishi Vishwavidyalaya, Raipur, during *kharif* seasons of 2018 and 2019 to find out the efficacy of different doses of triafamone 200 SC in direct seeded rice under irrigated condition. *Alternanthera triandra* and *Echinochloa colona* dominated the weed density and composed 92 and 98 % of total weed population respectively during 2018 and 2019. Post emergence application of triafamone 200 SC 100 g/ha at 2 to 3 leaf stage performed best and reduced the weed density very effectively and provided higher weed control efficiency (63.2 and 64.9 %) at 42 DAS over its lower doses and pyrazosulfuron ethyl 10% WP 15 g/ha and cyhalofopbutyl 10% EC 80 g/ha. Triafamone, 200 SC 100 g/ha had produced significantly higher grain yield (4.16 and 4.08 t/ha) of direct seeded rice over pyrazosulfuron ethyl 10% EC 15g/ha and cyhalofop butyl 10% EC 80 g/ha during 2018 and 2019. Triafamone 200 SC 50 g/ha also found to be comparable to that of its highest dose i.e. 100 g/ha. Application of triafamone 200 SC either at 50 or 100 g/ha had no phytotoxic symptom on rice during both the years. PoE of triafamone, 200 SC 100 g/ha and 50 g/ha found to be safe and control weeds effectively.

INTRODUCTION

Direct seeded rice (DSR) provides a good crop establishment as well as good yield potential if adequately kept under weed free environment (Rao *et al.*, 2007). 30-50 % saving in water has been claimed with DSR compared with conventional puddled transplanted rice (Yadav *et al.*, 2011). On an average, DSR can reduce total labor requirement from 11-66%. Recent estimates showed that average reduction in yield due to weeds varied from 12 to 72% depending upon weed flora and the extent of competition offered by weeds to the crop (Kumar *et al.*, 2009). The yield loss due to weeds varies from 40 to 100 per cent in direct seeded rice (Kumar *et al.*, 2010). In Chhattisgarh, area under direct seeded rice is increasing considerably due to availability of new seeding implements, use of pre emergence herbicide and non availability of labour during transplanting. DSR also gives higher yield with less cost of cultivation. On the other hand, a complex weed flora present in direct seeded field which compete with rice plants severely and poses yield losses mainly due to the absence of impounding of water at crop emergence. Herbicides have increasingly become a key component of weed management in India (Mallikarjun *et al.*, 2014). Post emergence herbicides like ethoxysulfuron, bispyribac-Na, pinoxsulam are very popular in DSR. However, at 2 to 3 leaf stage direct seeded rice crop severely compete with early emerged weeds and hence an early post emergence herbicide may be more effective than the traditional PoE herbicides. Triafamone, a new sulfonanilide herbicide having mode of action of inhibiting the enzyme acetolactate synthase (ALS) can effectively be used at 12-15 DAS i.e. 2-3 leaf stage against *Echinochloa crus-galli* and *Echinochloa colonum* and other

narrow leaved weeds in direct seeded or transplanted rice as compare to late post-emergence at rates of 20 to 50 g/ha using spray or granular formulations. Therefore, an investigation was conducted to find out the optimum dose of triafamone against complex weed flora in direct seeded rice.

MATERIALS AND METHODS

Field experiments were carried out at Indira Gandhi Krishi Vishwavidyalaya, Raipur, during *kharif* seasons of 2018 and 2019 to find out the efficacy of different doses of council prime (triafamone 200 SC) in direct seeded rice under irrigated condition. The soil texture of the experimental field was Vertisol, neutral (pH 7.2) in reaction with 4.80 kg/ha soil organic carbon, low N (208 kg/ha), medium P (15.4 kg/ha) and high K (332 kg/ha) content. The experiment was laid out in randomized block design (RBD) with three replications consisting of nine treatments viz. T₁: triafamone 200 SC 30g/ha, T₂: triafamone 200 SC 40 g/ha, T₃: triafamone 200 SC 50 g/ha, T₄: triafamone 200 SC 100 g/ha, T₅: pyrazosulfuron ethyl 10% WP 15 g/ha, T₆: cyhalofopbutyl 10% EC 80 g/ha, T₇: Farmers' practice (first hand weeding at 20 DAS and second hand weeding at 40 DAS), T₈: weed free (HW at 20, 40 and 60 DAS) and T₉: weedy check. The test variety of rice "Indira Rajeshwari (IGKV R 1)" was line sown with a row to row distance of 20 cm through seed cum fertilizer drill on 30/06/2018 and 08/07/2019 and harvested on 15/11/2018 and 30.11.2019, respectively. Recommended dose of fertilizer was 100:60:40 kg/ha of N:P₂O₅:K₂O. The whole amount of P and K was applied as basal dressing, while N was applied 50 per cent as basal, 25 per cent at maximum tillering stage and remaining 25 per cent at flowering stage of the crop. The crop did not suffer

with any kind of incidence like drought, insect, disease etc. during its entire growth period. The observations viz. weed flora, weed density, weed biomass and their effect on yield of rice and economic viability of different treatments were analyzed as per the standard procedure. All other agronomic practices were kept normal and uniform for all the treatments of the experiment. The herbicides were applied at 2 to 3 leaf stage of weeds by using knapsack sprayer with 375 liters of spray volume/ha as per treatment. The species and category wise weed density and dry weight was recorded using quadrat of 50 × 50 cm in both the seasons at 28 and 42 DAS from two randomly selected spots in each experimental plot. Weeds were uprooted from ground surface, and oven dried at 70 °C for determining dry weed biomass. All the data were subjected to Analysis of Variance techniques (ANOVA) after transformation wherever needed.

RESULTS AND DISCUSSION

Weed Flora

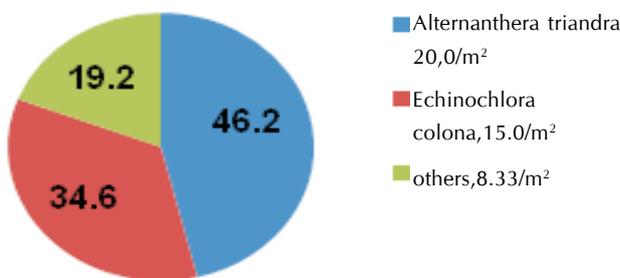
Weed flora of the experimental field consisted of *Echinochloa colona* among grasses, *Cyperus iria* among sedges and *Alternanthera triandra* among broad leaf weeds. Broad leaf weeds and grasses dominated the weed flora at all the growth stages as compared to sedges and other weeds. Sedges and other weeds like *Brachiaria ramosa*, *Sporobolus diander*, *Cyanotis axillaris*, *Commelina benghalensis* and *Ludwigia spp.*

were also found in irregular and less number. *Alternanthera triandra* and *Echinochloa colona* dominated the weed density and both shared 92 and 98 % of total weed population respectively during 2018 and 2019. *Alternanthera triandra* has dominated the weed flora by 46.2 and 49.7 % at 28 DAS and 52.4 and 50.3% at 42 DAS respectively, during 2018 and 2019 (Fig 1)

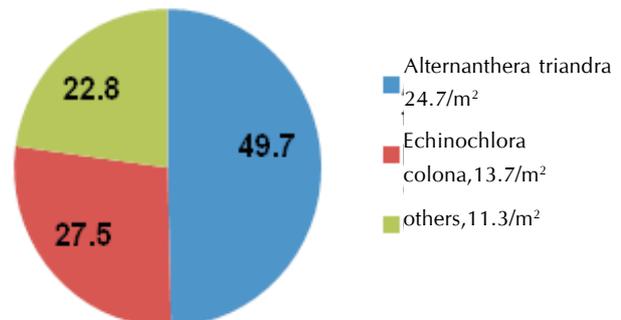
Weed density

Control of *Echinochloa colona* and other weeds was clearly visualized at 28 day after sowing during both the years of 2018 and 2019 by using different doses of triafamone 200 SC at 2 to 3 leaf stage of weeds. Triafamone 200 SC 100 g/ha found to be most impressive to control weeds over other doses, pyrazosulfuron ethyl 10% EC 15g/ha and cyhalofop butyl 10% EC 80 g/ha and reduced the weed density significantly. Triafamone 200 SC 50 g/ha also performed significantly well over its lower doses of 30 and 40 g/ha (Table 1). Triafamone is absorbed through the foliage and roots and offers pre-emergence and post-emergence control of weeds with foliar and soil residual activity. As triafamone inhibits the enzyme acetolactate synthase (ALS) and absorbed through foliage and roots, the effect of triafamone 200 SC 100 g/ha was sustained at 42 day after sowing and lower density of weeds were counted under this treatment. This might be due to the effective control of annual grasses and broad leaf weeds by this treatment on 42 DAS. The control of *Echinochloa colona* and other weeds was further improved during 2019 as compared

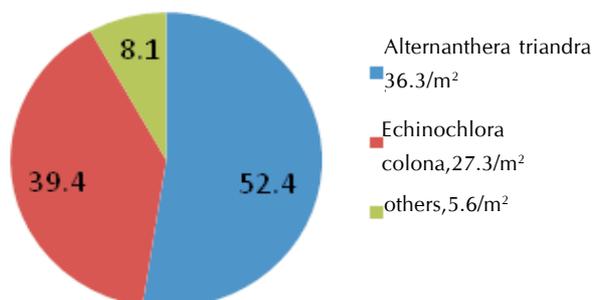
Percent share of weeds to the total and density(No./m²) at 28 DAS,2018



Percent share of weeds to the total and density(No./m²) at 28 DAS,2019



Percent share of weeds to the total and density(No./m²) at 42 DAS,2018



Percent share of weeds to the total and density(No./m²) at 42 DAS,2019

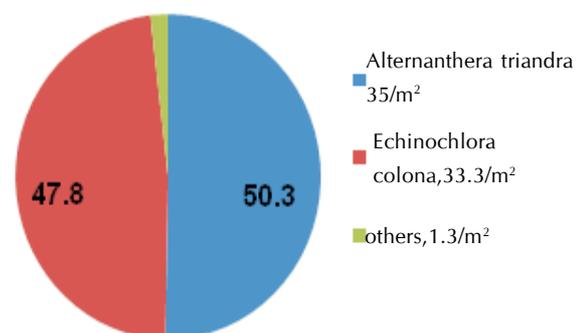


Fig. 1: Percent share of weeds to the total and their density in the unweeded control plots

Table 1: Triafamone influence on the weed density at 28 and 42 DAS of direct seeded rice

Treatment	Weed density, No./ m ² at 28 DAS										Weed density, No./ m ² at 42 DAS									
	Alternanthera triandra		Echinochloa colona		Other		Total		Alternanthera triandra		Echinochloa colona		Other		Total					
	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019				
T1- Untreated control	4.53 (20.00)	5.02 (24.67)	3.94 (15.00)	3.76 (13.67)	2.97 (8.33)	3.44 (11.33)	6.62 (43.33)	6.62 (43.33)	7.08 (49.67)	6.07 (36.33)	5.96 (35.00)	5.28 (27.33)	5.82 (33.33)	2.48 (5.67)	1.35 (1.33)	8.36 (69.66)				
T2-Triafamone 200 SC 30 g/ha at 2 to 3 leaf stage of weed	2.8 (7.33)	4.14 (16.67)	2.97 (8.33)	1.58 (2.00)	2.74 (7.00)	2.97 (8.33)	4.81 (22.66)	4.81 (22.66)	5.24 (27.00)	5.37 (28.33)	4.53 (20.00)	2.61 (6.33)	2.41 (5.33)	3.98 (15.33)	3.34 (10.67)	7.11 (49.99)				
T3- Triafamone 200 SC) 40 g/haat 2 to 3 leaf stage of weed	2.35 (5.00)	4.06 (16.00)	2.55 (6.00)	1.58 (2.00)	2.48 (5.67)	0.91 (0.33)	4.14 (16.67)	4.14 (16.67)	4.34 (18.33)	4.1 (16.33)	4.06 (16.00)	2.55 (6.00)	1.78 (2.67)	3.72 (13.33)	3.34 (10.67)	6.01 (35.66)				
T4- Triafamone 200 SC 50 g/ha at 2 to 3 leaf stage of weed	1.78 (2.67)	3.24 (10.00)	2.35 (5.00)	1.47 (1.67)	2.61 (6.33)	0	3.81 (14.00)	3.81 (14.00)	3.76 (13.67)	3.81 (14.00)	3.54 (12.00)	2.27 (4.67)	1.35 (1.33)	3.54 (12.00)	3.34 (10.67)	5.58 (30.67)				
T5- Triafamone 200 SC 100 g/haat 2 to 3 leaf stage of weed	1.58 (2.00)	2.92 (8.00)	1.08 (0.67)	1.35 (1.33)	2.86 (7.67)	0	3.29 (10.34)	3.29 (10.34)	3.67 (13.00)	3.19 (9.67)	3.49 (11.67)	1.78 (2.67)	1.22 (1.00)	3.29 (10.33)	2.97 (8.33)	4.81 (22.67)				
T6- Pyrazosulfuron ethyl 10% WP	2.55 (6.00)	4.1 (16.33)	1.96 (3.33)	1.58 (2.00)	3.34 (10.67)	0.91 (0.33)	4.53 (20.00)	4.53 (20.00)	4.38 (18.66)	4.02 (15.67)	4.67 (21.33)	4.14 (16.67)	3.24 (10.00)	3.14 (9.33)	3.03 (8.67)	6.49 (41.67)				
T7- Cyhalofop Butyl 10% EC	4.53 (20.00)	4.67 (21.33)	1.47 (1.67)	1.22 (1.00)	4.1 (16.33)	3.29 (10.33)	6.2 (38.00)	6.2 (38.00)	5.76 (32.66)	6.57 (42.67)	6.47 (41.33)	1.58 (2.00)	1.68 (2.33)	3.94 (15.00)	1.08 (0.67)	7.76 (59.67)				
T8- Farmer practice (two hand weeding) 20 & 40 DAS	1.58 (2.00)	1.87 (3.00)	1.08 (0.67)	1.35 (1.33)	2.41 (5.33)	1.58 (2.00)	2.92 (8.00)	2.92 (8.00)	2.61 (6.33)	2.2 (4.33)	1.96 (3.33)	2.8 (7.33)	2.35 (5.00)	1.96 (3.33)	0	3.94 (14.99)				
T9- Weed free	0.71 0	0.71 0	0.71 0	0.71 0	0.71 0	0.71 0	0.71 0	0.71 0	0.71 0	0.71 0	0.71 0	0.71 0	0.71 0	0.71 0	0.71 0	0.71 0				
SEM±	0.06	0.08	0.07	0.06	0.05	0.06	0.1	0.1	0.11	0.1	0.09	0.08	0.09	0.06	0.05	0.13				
C.D. (P=0.05)	0.21	0.24	0.2	0.17	0.14	0.18	0.31	0.31	0.34	0.31	0.28	0.24	0.27	0.18	0.17	0.4				

Table 2: Triafamone influence on the weed dry weight at 28 and 42 DAS of direct seeded rice

Treatment	Weed dry weight, g/ m ² at 28 DAS						Weed dry weight, g/ m ² at 42 DAS									
	Alternanthera triandra		Echinochloa acolona		Others		Alternanthera triandra		Echinochloa acolona		Others		Total			
	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019		
T1- Untreated control	4.10 (16.27)	4.45 (19.33)	3.42 (11.20)	3.38 (10.90)	2.94 (8.13)	2.68 (6.70)	6.01 (35.60)	6.12 (36.93)	7.33 (53.23)	7.18 (51.00)	5.73 (32.33)	6.23 (38.33)	2.30 (4.77)	1.73 (2.50)	9.53 (90.33)	9.61 (91.83)
T2-Triafamone 200 SC 30 g/ha 2 to 3 leaf stage of weed	2.81 (7.37)	3.86 (14.40)	2.44 (5.47)	1.84 (2.90)	2.70 (6.77)	1.98 (3.43)	4.48 (19.61)	4.61 (20.73)	5.76 (32.63)	5.56 (30.37)	3.49 (11.70)	2.58 (6.17)	4.11 (16.37)	4.20 (17.17)	7.82 (60.70)	7.36 (53.71)
T3- Triafamone 200 SC 40 g/ha 2 to 3 leaf stage of weed	2.79 (7.30)	3.82 (14.13)	2.26 (4.60)	1.82 (2.80)	2.46 (5.57)	0.79 (0.13)	4.24 (17.54)	4.19 (17.06)	5.67 (31.70)	5.06 (25.07)	3.38 (10.93)	2.49 (5.70)	3.83 (14.20)	4.03 (15.77)	7.57 (56.83)	6.86 (46.54)
T4- Triafamone 200 SC 50 g 2 to 3 leaf stage of weed	2.31 (4.83)	3.74 (13.47)	2.25 (4.57)	1.77 (2.63)	2.29 (4.73)	0.71 (0.00)	3.82 (14.13)	4.07 (16.10)	4.67 (21.30)	4.63 (20.97)	2.26 (4.60)	2.02 (3.57)	4.01 (15.57)	3.78 (13.77)	6.48 (41.47)	6.23 (38.31)
T5- Triafamone 200 SC 100 g 2 to 3 leaf stage of weed	1.67 (2.30)	3.56 (12.17)	1.64 (2.20)	1.32 (1.23)	3.05 (8.80)	0.71 (0.00)	3.71 (13.30)	3.73 (13.40)	4.41 (18.93)	4.34 (18.33)	1.75 (2.57)	1.85 (2.93)	3.50 (11.73)	3.39 (11.00)	5.81 (33.23)	5.72 (32.26)
T6- Pyrazosul furon ethyl 10% WP	2.58 (6.17)	3.88 (14.53)	2.32 (4.87)	1.82 (2.83)	2.55 (6.00)	0.95 (0.40)	4.19 (17.04)	4.27 (17.76)	4.73 (21.90)	5.71 (32.07)	4.67 (21.33)	2.54 (5.97)	3.70 (13.17)	3.37 (10.87)	7.54 (56.40)	7.03 (48.91)
T7- Cyhalofop Butyl 10% EC	4.25 (17.59)	3.92 (14.83)	1.47 (1.67)	1.28 (1.13)	3.20 (9.77)	3.35 (10.70)	5.43 (29.03)	5.21 (26.66)	7.98 (63.13)	7.78 (60.03)	1.54 (1.87)	1.28 (1.13)	3.89 (14.67)	1.57 (1.97)	8.95 (79.67)	7.98 (63.13)
T8- Farmer practice (two hand weeding) 20 & 40 DAS	1.44 (1.57)	1.53 (1.83)	1.64 (2.20)	1.44 (1.57)	0.71 (0.00)	1.22 (1.00)	2.07 (3.77)	2.21 (4.40)	2.00 (3.50)	1.66 (2.27)	1.96 (3.33)	1.71 (2.43)	1.84 (2.90)	0.71 (0.00)	3.20 (9.73)	2.28 (4.70)
T9- Weed free	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)	0.71 (0.00)
SEM ±	0.06	0.07	0.05	0.05	0.05	0.04	0.09	0.10	0.12	0.11	0.09	0.10	0.06	0.06	0.16	0.15
C.D. (P=0.05)	0.19	0.22	0.16	0.16	0.15	0.13	0.28	0.29	0.36	0.34	0.28	0.29	0.19	0.20	0.47	0.47

Table 3: Effect of different doses of triafamone on weed control efficiency in direct seeded rice

Treatment	Weed Control Efficiency (%) at 28 DAS						Weed Control Efficiency (%) at 42 DAS					
	<i>Alternanthera triandra</i>		<i>Echinochloa colona</i>		Total		<i>Alternanthera triandra</i>		<i>Echinochloa colona</i>		Total	
	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019
T1- Untreated control	-	-	-	-	-	-	-	-	-	-	-	-
T2- Triafamone 200 SC 30 g/ha at 2 to 3 leaf stage of weed	54.7	25.5	51.16	73.39	45.11	43.87	38.7	40.45	63.81	83.9	32.8	41.51
T3- Triafamone 200 SC 40 g/ha at 2 to 3 leaf stage of weed	55.13	26.9	58.93	74.31	50.73	53.8	40.45	50.84	66.19	85.13	37.09	49.32
T4- Triafamone 200 SC 50 g/ha at 2 to 3 leaf stage of weed	70.31	30.32	59.2	75.87	60.31	56.4	59.98	58.88	85.77	90.69	54.09	58.28
T5- Triafamone 200 SC 100 g 2 to 3 leaf stage of weed	85.86	37.04	80.36	88.72	62.64	63.72	64.44	64.06	92.05	92.36	63.21	64.87
T6- Pyrazosulfuron ethyl 10% WP	62.08	24.83	56.52	74.04	52.13	51.91	58.86	37.12	34.02	84.42	37.56	46.74
T7- Cyhalofop Butyl 10% EC	-8.11	23.28	85.09	89.63	18.46	27.81	-18.6	-17.71	94.22	97.05	11.8	31.25
T8- Farmer practice (two hand weeding) 20 & 40 DAS	90.35	90.53	80.36	85.6	89.41	88.09	93.42	95.55	89.7	93.66	89.23	94.88
T9- Weed free	100	100	100	100	100	100	100	100	100	100	100	100

to previous year under almost all the doses of triafamone 200 SC. Rosinger *et al.* (2012) have also shown that triafamone can be effectively used in direct seeded or transplanted rice as early to late post-emergence at rates of 20 to 50 g/ha against *Echinochloa crus-galli* and *Echinochloa colonum*.

Weed dry weight

Apart from the weed free treatment and farmers practice, significantly the lowest weed dry weight at 28 (3.71 and 3.73 g/m²) and 42 DAS (5.81 and 5.72 g/m²) was recorded under the triafamone 200 SC 100 g/ha applied at 2 to 3 leaf stage of weeds as compared to pyrazosulfuron ethyl 10% EC 15g/ha and cyhalofop-butyl 10% EC 80 g/ha, the reference chemicals during both the study years. Singh *et al.* (2016) also noticed significantly lower dry weight under the treatments having ALS inhibitor herbicides to that of cyhalofop butyl an ACCase inhibitor. Even, the lower doses of triafamone 200 SC could not control the weeds effectively (Table 2). Dry weight of *Echinochloa colona* and *Alternanthera triandra* decreased with the increase in dose of triafamone however, the differences between 40 and 50 g/ha and between 50 and its highest dose of 100 g/ha were significantly observed at 28 DAS as compared to 42 DAS during both the years. Whereas, difference in total dry weight due to different doses of triafamone was less among the different doses.

Weed control efficiency

At 28 DAS, the weed control efficiency (WCE) for controlling the *Alternanthera triandra* under different doses of triafamone 200 SC was higher during 2018, while owing to the higher infestation of this weed during 2019 or might be due to lower efficacy of triafamone on *Alternanthera triandra*, the WCE was not comparable to that of previous year (Table 3). On the other hand, triafamone 200 SC controlled the *Echinochloa colona* and other weeds very effectively; hence the higher WCE was registered during both the years. At 42 DAS, the weed density increased under uncontrolled plots as compared

to treated plots, hence, despite of little increase in the population of *Alternanthera triandra*, the total WCE of different concentrations of triafamone was also increased accordingly (Table 6). Doses of triafamone 200 SC *i.e.* 50 and 100 g/ha at 2 to 3 leaf stage of weed has controlled the *Echinochloa colona* very effectively and achieved almost equal WCE (92.05 and 92.36%) to that of cyhalofop butyl 10% EC 80 g/ha (94.22 and 97.05%) during 2018 and 2019 respectively, for that particular weed.

Weed Index

Next to the farmer's practice (two hand weeding at 20 & 40 DAS), treatment having the lowest weed index (16.13 and 12.38%), the lowest weed index (21.06 and 19.84%) registered under triafamone 200 SC 100 g/ha indicated superiority followed by triafamone 200 SC 50 g/ha (23.53 and 23.58%) in next order among all the herbicidal treatments during kharif 2018 and 2019 respectively (Table 4).

Yield attributes and grain yield

Data pertaining to number of effective tillers/m² and grains/panicle showed that among all the treatments, the weed free treatment produced maximum number of effective tillers/m² and lowest was noticed under the weedy check treatment. Grain yield is expressed in terms of maximum of yield attributes *viz.*, effective tillers, grains/panicle and 1000 grain weight due to reduced crop weed competition in weed free plots resulted in higher grain yield by 85.5 and 82.9% than that observed in weedy check plots during two crop seasons, respectively.

Among the herbicidal treatment, highest number of effective tillers/m² (276 and 264) and grains/panicle (103 and 101) was recorded under the application of triafamone 200 SC 100 g/ha at 2 to 3 leaf stage of weeds during 2018 and 2019, respectively and produced the 81.7 and 78.7% higher grain yield as compared to weedy check. It was followed by 50 and 40 g/ha doses of triafamone 200 SC. These values have

Table 4: Effect of different doses of triafamone on yield attributes and grain yield of direct seeded rice

Treatment	Effective tillers / m ²		Grains/ panicle		Test weight (g)		Grain yield t/ha		Weed index (%)	
	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019
T1- Untreated control	82	103	45	73	28.67	29	0.76	0.87	85.58	82.91
T2- Triafamone 200 SC 30 g/ha at 2 to 3 leaf stage of weed	189	212	96	93	30.33	30	3.48	3.66	33.97	28.09
T3- Triafamone 200 SC 40 g/ha at 2 to 3 leaf stage of weed	252	244	98	95	30.67	30.33	3.86	3.84	26.76	24.56
T4- Triafamone 200 SC 50 g/ha at 2 to 3 leaf stage of weed	266	247	97	95	30.67	30.67	4.03	3.89	23.53	23.58
T5- Triafamone 200 SC 100 g/ha at 2 to 3 leaf stage of weed	276	264	103	101	31	31.33	4.16	4.08	21.06	19.84
T6- Pyrazosulfuron ethyl 10% WP 15 g/ha at 2 to 3 leaf stage of weed	242	239	95	93	30.33	30	3.83	3.75	27.32	26.33
T7- Cyhalofopbutyl 10% EC 80 g/ha at 2 to 3 leaf stage of weed	167	194	89	85	30.33	29.67	3.19	3.33	39.47	34.58
T8- Farmer practice (two hand weeding) 20 & 40 DAS	291	277	109	105	31.33	32	4.42	4.46	16.13	12.38
T9- Weed free	293	280	121	118	32	32	5.27	5.09	0	0
SEm ±	7	8	2	2	1	0.84	0.12	0.09	-	-
C.D. (P=0.05)	20	23	5	6	NS	NS	0.35	0.28	-	-

ultimately contributed to higher grain yield. Different weed management practices and herbicides did not influence the test weight significantly.

The highest grain yield 5.27t/ha in 2018 and 5.09 t/ha in 2019 was recorded in weed free treatment followed by farmers' practice (2 HW) (4.42 and 4.46 t/ha, respectively). Among the herbicide treatments, significantly the highest grain yield (4.16 and 4.08 t/ha) was recorded under the application of triafamone 200 SC 100 g/ha at 2 to 3 leaf stage of weeds over pyrazosulfuron ethyl 10% WP 15 g/ha and cyhalofop butyl 10% EC 80 g/ha during 2018 and 2019 respectively. 50 g/ha dose of triafamone 200 SC also produced the comparable grain yield to that of 100 g/ha dose. The increase in yield under triafamone 200 SC 100 g/ha over pyrazosulfuron ethyl 10% WP and cyhalofop butyl 10% EC 80 g/ha was 23.3 and 18.4 % during 2018 and 2019 respectively (Table 4). Yadav *et al.* (2019) have also reported that among different herbicidal treatments, the grain yield of rice was significantly higher in plots treated with triafamone as compared to pyrazosulfuron ethyl 10% WP 15 g/ha.

Based on the two years data on the different doses of triafamone 200 SC at 2 to 3 leaf stage of weeds, it can be concluded that, higher doses of 100g/ha and 50 g/ha are safe and control effectively the total weed density at 28 and 42 DAS and produced the grain yield significantly as compared to its lower doses and other herbicides herbicidal treatments. However, its effect against the *Alternanthera triandra* was little lower during the 2019 than the previous year. triafamone 200 SC has no phytotoxic effect and found to be safe for rice.

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