Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2020; 9(3): 1148-1153
Received: 05-03-2020
Accepted: 07-04-2020

Shivashenkaramurthy M
Scientist, Agronomy, ICAR-Krishi Vigyan Kendra, Sirsi, Uttara Kannada, Karnataka, India

Roopa S Patil
Scientist (Agr. Ent.), ICAR-Krishi Vigyan Kendra, Sirsi, Uttara Kannada, Karnataka, India

Annapurna Neeralagi
Technical Officer (Comp), ICAR-Krishi Vigyan Kendra, Sirsi, Uttara Kannada, Karnataka, India

Agasimani AD
Scientist, Horticulture, ICAR-Krishi Vigyan Kendra, Saidapur Farm, Dharwad, Karnataka, India

Corresponding Author:
Shivashenkaramurthy M
Scientist, Agronomy, ICAR-Krishi Vigyan Kendra, Sirsi, Uttara Kannada, Karnataka, India

Evaluation of bio efficacy and phytotoxicity of quinchlorac (facet) for control of grassy weeds and sedges in rainfed transplanted rice

Shivashenkaramurthy M, Roopa S Patil, Annapurna Neeralagi and Agasimani AD

Abstract
An experiment was conducted to evaluate the Bio-efficacy and Phyto-toxicity of Quinchlorac 180 g/l SL (Facet 180 g/l SL) against grassy weeds and sedges in paddy at Krishi Vigyan Kendra, Sirsi of UAS, Dharwad during 2013-14. This Quinchlorac 180 g/l SL was tried at different concentrations (135, 180, 225 and 450 g a.i/ha). The efficacy of this test herbicide formulation was compared with other herbicide viz. Bispyribac Sodium 10% SC @ 20 g a.i./ha, Cyhalofop Butyl 10 % EC @ 100 g a.i./ha and Butachlor 50 % EC @ 1250 g a.i./ha. The Significant control of grassy weeds and sedges were obtained with Quinchlorac 180 g/l SL @225 g a.i/ha as compared to other herbicides and untreated control. No Phyto-toxicity effect on rice was observed with any of the treatments. The Grain yield and straw yield of Rice was more with Quinchlorac 180 g/l SL @ 225g a.i/ha and on par with Quinchlorac 180 g/l SL @ 180 g a.i./ha.

Keywords: Quinchlorac 180 g/l SL, Grassy weeds, Sedges, Bio-efficacy, Phyto-toxicity, Paddy

Introduction
Rice (*Oryza sativa* L.) is the leading cereal of the world (Juraimi *et al.*, 2013) [1]. World's rice demand is projected to increase by 25% from 2001 to 2025 to keep pace with population growth (IRRI, 2003) [2]. Rice in India, contributing to about 40% of total food grain production. Weeds remove a large amount of nutrients from soil. An estimate shows that weeds can deprive the crops by 47% N, 42% P, 50% K, 39% Ca and 24% Mg of their nutrient uptake as well as reduce the yield potential by harboring number of crop pests (Balasubramaniyan and Palaniappan, 2001) [3]. Hence successful weed control is essential for obtaining optimum yield of rice. Transplanted rice is the most common practice throughout the world. Normally puddling is done to reduce percolation losses, to control weeds and to make transplanting operation easier. Puddling and land submergence in transplanted rice provide a greater competitive advantage to crop over weeds as latter suffer due to unfavorable conditions for growth and development as compared to other methods of rice establishment. Thus, management of weeds is a fundamental requirement in transplanted rice cultivation.
Weed free period during the critical period of competition is essential for obtaining optimum rice yield. This can be achieved by removing weeds manually, mechanically and through chemical sprays or by their combinations. Manual weeding is although effective and most common method, however, scarcity and high wages of labour particularly during peak period of agricultural operations make this method uneconomic. Further, it is possible only when the weed growth is to a size large enough for hand removal, by that time the weeds have done considerable damage to the crop. Further, mechanical method of weed management is also time taking, cost intensive, much tedious and also does not remove all the weeds. Herbicidal weed management becomes a competitive and promising way to control weeds in transplanted rice, at least for first few weeks after transplanting of crop. The use of herbicides, therefore appears to be the only alternative (Alstorm, 1990) [4] and in the present context, it is most preferable and farmer can easily go for it, because day-by-day labour scarcity increased. Weed management in transplanted rice through herbicide application may be the best suited option. Weed competition is one of the most important factors in limiting the yield of rice. Among the different weed species, grassy weeds pose greater competition (Priyanka Abdal *et al.*, 2018) [5]. They have an extensive and fibrous root system. Similarly, sedges grow huge in number and cause serious competition for nutrients. The roots of the sedges also dominate the surface feeding zone and obstruct nutrient flow to crop roots. Singh *et al.*, (2005) [6] found that grasses constituted 14.1%, sedges 71.4% and broad-leaf weeds 14.5% of the total weed population in

Rice crop. Janiya (2002) [7] reported that grain yield losses due to weeds in lowland rice field ranges 20% to 60% and 30% to 80% in transplanted rice. Hence, study was formulated to study bio-efficacy and phyto-toxocity of new herbicide Quinchlorac 180 g/l SL (Facet 180 g/l SL) in rainfed transplanted paddy.

Material and methods

An experiment was conducted to evaluate the Bio efficacy and Phytotoxicity of Quinchlorac 180 g/l SL (Facet 180 g/l SL) against Grassy weeds and sedges in paddy crop at Krishi Vigyan Kendra, Sirsi of University of Agricultural Sciences, Dharwad during 2013-14. Krishi Vigyan Kendra Sirsi lies in the hill zone of Karnataka. It has an attitude of 619 m with latitude of 14^0 26' N and longitude of 74^0 50' E and is high rainfall area coming under malnad region.

The herbicide formulation Quinchlorac 180 g/l SL (Facet 180 g/l SL) was evaluated for its bio-efficacy on weed flora in rainfed transplanted rice. This formulation (Quinchlorac 180 g/l SL) was tried at different concentrations (135, 180 and 225 g a.i/ha). Treatments formulated under study were T_1 – Quinchlorac 180g/l SL@135 g a.i./ha, T_2 - Quinchlorac 180g/l SL@180 g a.i./ha, T_3 - Quinchlorac 180g/l SL@ 225 g a.i./ha, T_4 – Bispyribac Sodium 10% SC @ 20 g a.i./ha, T_5 – Cyhalofop Butyl 10 % EC @ 100 g a.i./ha, T_6 - Butachlor 50 % EC @ 1250 g a.i./ha, T_7 - Control and T_8 – Weed free Check. The herbicide formulation Quinchlorac 180 g/l SL was also evaluated for its Phytotoxicity on rain fed transplanted rice in the same experiment in the treatments viz. T_1 -Quinchlorac 180 g/l SL at 225g a.i./ha and T_2-450 g a.i./ha were compared with T_3 - control.

The experiment was laid out in Randomized Block Design (RBD) with three replication. The plot size was 5.0 m X 3.0 m. A longer duration rice variety Abhilash was used in the study. The pre-germinated seeds were sown on 23rd June, 2013 in the wet method of nursery. The seedlings were raised in wet method and transplanted in the main experimental field on 23rd July 2013, with the spacing of 20 x 15 cm. A recommended dose of dolomite (500 kg/ha) during land preparation and fertilizers at the rate of 75:75:87.5 kg NPK/ha were given. Necessary plant protection and water management practices were followed. The crop was harvested at maturity on 6th December 2013 to record grain yield and straw yield.

Herbicide application: The test herbicide *viz*, Quinchlorac 180 g/l SL as well as check herbicide were sprayed on 18th August, 2013 at 2-3 leaf stage of weed flora and Butachlor was applied 2 days after transplanting. High volume (Knapsack) sprayer fitted with WFN 20 nozzle was used for spraying. The spray volume used was 500 liters per hectare.

Weed Bio-Metric Observations

Weed density

Species wise weed Populations at 20, 30, 45 and 60 days after spray herbicide were recorded.

Weed Control Efficiency (WCE)

It is calculated by the following formula and recorded in percentage at 20, 30, 45 and 60 days after application.

Crop observations

Qualitative Phytotoxicity Symptoms (visual assessment) Observation for the specific parameters like epinasty and hyponasty, chlorosis, stunting, wilting, Scorching and necrosis were recorded in main crop at 1, 3, 5, 7, 10, days after application.

The observation were recorded using following scale

Score	Phytotoxicity
0	No Phytotoxicity
1	0-10
2	11-20
3	21-30
4	31-40
5	41-50
6	51-60
7	61-70
8	71-80
9	81-90
10	91-100

Crop yield: Grain yield and straw yields of Paddy crop were recorded and reported in kilo grams per hectare.

Results and discussion

Weed flora observed in the experimental field

In the experimental plots, the dominant grassy weeds were *Echinocloa crusi galli, Ehinocloa colonum Cynodon dactylon, Panicum repense, Paspalum conjugatum and Digitarium sanuinalis.* Among sedges, *Cyperus rotundus* was main weed. Ramchandra *et al.,* (2010) [8] and Patra *et al.,* (2011) [9] reported similar weeds in transplanted rice.

Effect at herbicide application on weed count/m^2 (Table 1-4)

In general, species- wise weed population was significantly lower in herbicidal treatment plots as compared to untreated control. Among the weedicides treatments, all the post emergent weedicides recorded significantly lower weeds than Butachlor 50 % EC @ 1250 g a.i./ha. The tested chemical, Quinchlorac 180 g/l SL has recorded the lesser weed population at all the days after spray of herbicides. The treatment receiving Quinchlorac 180 g/l SL @ 225 ga.i./ha has recorded lower weed population as compared to other herbicidal treatments. These results are conformity with the findings of Amarasinghe *et al.,* (1999) [10] and Ramesh, Y.M. (2017) [11] stated that, application of Quinchlorac @ 312.5 g/ha recorded significantly lower weeds count/m^2. The total weed count /population (Monocot + Sedges) recorded at 20, 30, 45, and 60 days after spray of herbicide are given tables 1 to 8. Among the tested chemical, Quinchlorac 180 g /l SL 225 g a.i./ha has recorded significantly lower total weed population as compared to other treatment. Significantly higher total weed count / m2 was recorded in untreated control at all the stages. In general, all the herbicidal treatments recorded lesser number of monocot weeds than untreated control. Among the herbicidal treatments, Quinchlorac 180 g/l SL @ 225 g a.i./ha recorded lesser total weeds but on par with Quinchlorac 180 g/l SL.@180 ga.i.//ha. Number of monocot weeds was significantly higher total weeds in in untreated control. Similar results were found in case of sedges also at all stages.

Table 1: Species-wise weed count /m^2 recorded in different herbicide treatments at 20 days after herbicide spray

Treatments	Monocots							Sedges	Total Weeds (M+S)
	Echinocloa crusigalli	*Echinocloa colonum*	*Cynodon dactylon*	*Panicum repense*	*Paspalum conjugatum*	*Digitarium sanuinalis*	Total	*Cyperus rotundus*	
T_1	0.88 (0.33)	0.88 (0.33)	1.47 (1.67)	1.18 (1.00)	1.05 (0.67)	0.88 (0.33)	2.20 (4.3)	2.34 (5.00)	3.13 (9.33)
T_2	0.88(0.33)	0.88 (0.33)	1.18 (1.00)	1.05 (0.67)	0.88 (0.33)	0.88 (0.33)	1.75 (2.67)	1.90 (3.33)	2.48 (6.0)
T_3	0.88 (0.33)	0.71 (0.00)	1.01 (0.67)	0.88 (0.33)	0.88 (0.33)	0.71 (0.00)	1.28 (1.33)	1.57 (2.00)	1.90 (3.33)
T4	1.05 (0.67)	1.05 (0.67)	1.18 (1.00)	1.05 (0.67)	1.05 (0.67)	0.88 (0.33)	2.80 (7.33)	2.10 (4.0)	3.44 (11.33)
T5	1.47 (1.67)	1.22 (1.00)	1.28 (1.33)	1.01 (0.67)	0.88 (0.33)	0.88 (0.33)	2.59 (6.33)	1.75 (2.67)	3.05 (9.0)
T6	1.87 (3.00)	1.70 (2.33)	2.02 (3.67)	1.70 (2.33)	1.75 (2.67)	1.60 (2.00)	5.15 (26.0)	3.72 (13.3)	6.31 (39.33)
T7	2.92 (8.00)	2.68 (6.67)	3.03 (8.67)	2.39 (5.33)	2.34 (5.00)	2.19 (4.33)	6.42 (40.67)	4.86 (23.3)	8.02 (64.00)
T8	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 (0.0)
CV	18.83	16.42	27.09	24.78	25.21	21.88	11.36	17.50	13.17
C.D. at 5 %	0.44	0.35	0.70	0.54	0.53	0.42	0.57	0.73	0.84
S.Em ±	0.14	0.12	0.23	0.18	0.17	0.14	0.19	0.24	0.28

Figures in parenthesis are Actual values.

Table 2: Species-wise weed count /m^2 recorded in different herbicide treatments at 30 days after herbicide spray

Treatments	Monocots							Sedges	Total Weeds (M+S)
	Echinocloa crusigalli	*Echinocloa colonum*	*Cynodon dactylon*	*Panicum repense*	*Paspalum conjugatum*	*Digitarium sanuinalis*	Total	*Cyperus rotundus*	
T_1	1.18 (1.00)	1.01 (0.67)	1.77 (2.67)	1.18 (1.00)	1.05 (0.67)	0.88 (0.33)	3.01 (9.00)	2.41 (5.33)	3.81 (14.33)
T_2	1.22 (1.00)	1.05 (0.67)	1.67 (2.33)	1.05 (0.67)	0.88 (0.33)	0.88 (0.33)	3.09 (9.00)	2.27 (3.67)	3.76 (13.69)
T_3	0.88 (0.33)	0.88 (0.33)	1.47 (1.67)	0.88 (0.33)	0.88 (0.33)	0.88 (0.33)	2.67 (6.67)	1.87 (3.00)	3.20 (9.67)
T_4	1.05 (0.67)	1.18 (1.00)	1.48 (2.00)	1.18 (1.00)	1.05 (0.67)	0.88 (0.33)	3.67 (13.00)	2.71 (7.00)	4.53 (20.0)
T_5	1.35 (1.33)	1.35 (1.33)	1.65 (2.67)	1.18 (1.00)	1.01 (0.67)	0.88 (0.33)	3.67 (13.00)	2.34 (5.00)	4.31 (18.0)
T_6	1.87 (3.00)	1.70 (2.33)	2.47 (5.67)	1.70 (2.33)	1.82 (3.00)	1.70 (2.33)	5.88 (34.00)	3.85 (14.33)	6.98 (48.33)
T_7	3.07 (9.00)	2.86 (7.67)	3.16 (11.67)	2.67 (6.67)	2.41 (5.33)	2.61 (6.33)	7.27 (52.33)	5.03 (25.00)	8.82 (77.33)
T_8	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 (0.0)
CV	19.89	22.54	24.49	22.75	29.28	23.53	8.98	13.27	7.36
C.D. at 5 %	0.49	0.53	0.77	0.52	0.63	0.49	0.59	0.62	0.58
S.Em ±	0.16	0.17	0.25	0.17	0.21	0.16	0.19	0.20	0.19

Figures in parenthesis are Actual values

Table 3: Species-wise weed count /m^2 recorded in different herbicide treatments at 45 days after herbicide spray

Treatments	Monocots							Sedges	Total Weeds (M+S)
	Echinocloa crusigalli	*Echinocloa colonum*	*Cynodon dactylon*	*Panicum repense*	*Paspalum conjugatum*	*Digitarium sanuinalis*	Total	*Cyperus rotundus*	
T_1	1.45 (1.67)	1.18 (1.00)	2.02 (3.67)	1.40 (1.67)	1.18 (1.00)	1.01 (0.67)	3.64 (13.00)	2.55 (6.00)	4.38 (19.00)
T_2	1.47 (1.67)	1.05 (0.67)	1.87 (3.00)	1.18 (1.00)	0.88 (0.33)	1.05 (0.67)	3.48 (11.67)	2.33 (5.00)	4.12 (16.67)
T_3	1.18 (1.00)	0.88 (0.33)	1.77 (2.67)	1.18 (1.00)	0.88 (0.33)	0.88 (0.33)	3.03 (8.67)	2.05 (3.67)	3.58 (12.33)
T_4	1.35 (1.33)	1.30 (1.33)	1.87 (3.00)	1.18 (1.00)	1.05 (0.67)	1.01 (0.67)	4.15 (16.67)	2.71 (7.00)	4.88 (23.67)
T_5	1.57 (2.00)	1.47 (1.67)	1.96 (3.67)	1.30 (1.33)	1.18 (1.00)	0.88 (0.33)	4.07 (16.00)	2.48 (5.66)	4.68 (61.67)
T_6	2.26 (4.67)	1.77 (2.67)	2.93 (8.33)	2.05 (3.67)	1.97 (3.67)	1.87 (3.33)	6.22 (38.00)	3.90 (14.67)	7.29 (52.67)
T_7	3.19 (9.67)	3.30 (10.3)	3.82 (14.00)	3.00 (8.67)	2.53 (6.00)	2.86 (7.67)	7.74 (58.33)	5.23 (26.00)	9.31 (86.33)
T_8	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 (0.0)
CV	18.49	24.42	20.48	23.20	31.80	25.76	6.61	12.46	4.85
C.D. at 5 %	0.53	0.62	0.76	0.61	0.72	0.58	0.48	0.60	0.41
S.Em ±	0.18	0.21	0.25	0.20	0.24	0.19	0.16	0.20	0.14

Figures in parenthesis are Actual values

Table 4: Species-wise weed count /m^2 recorded in different herbicide treatments at 60 days after herbicide spray

Treatments	Monocots							Sedges	Total Weeds (M+S)
	Echinocloa crusigalli	*Echinocloa colonum*	*Cynodon dactylon*	*Panicum repense*	*Paspalum conjugatum*	*Digitarium sanuinalis*	Total	*Cyperus rotundus*	
T_1	1.80 (2.67)	1.28 (1.33)	2.27 (4.67)	1.50 (2.00)	1.30 (1.33)	1.18 (1.00)	3.97 (15.33)	2.74 (7.00)	4.78 (22.33)
T_2	1.65 (2.33)	1.18 (1.00)	2.19 (4.33)	1.18 (1.00)	1.05 (0.67)	1.18 (1.00)	3.90 (14.67)	2.67 (6.67)	4.67 (21.33)
T_3	1.40 (1.67)	1.22 (1 .00)	2.05 (3.67)	1.18 (1.00)	1.05 (0.67)	0.88 (0.33)	3.38 (11.00)	2.27 (4.67)	4.00 (15.67)
T_4	1.60 (2.00)	1.30 (1.33)	2.26 (4.67)	1.28 (1.33)	1.18 (1.00)	1.01 (0.67)	4.60 (20.67)	2.99 (8.67)	5.45 (29.33)
T_5	1.75 (2.67)	1.47 (1.67)	2.39 (5.33)	1.40 (1.67)	1.18 (1.00)	0.88 (0.33)	4.67 (21.33)	2.61 (6.3)	5.32 (27.67)
T_6	2.34 (5.00)	2.05 (3.67)	3.20 (10.00)	2.05 (3.67)	2.17 (4.33)	1.97 (3.33)	6.58 (47.67)	3.99 (15.33)	7.62 (58.0)
T_7	3.29 (10.3)	3.39 (11.0)	4.11 (16.33)	3.00 (8.67)	2.61 (6.33)	2.92 (8.00)	8.32 (68.67)	5.33 (28.00)	9.86 (96.67)
T_8	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 (0.0)
CV	20.35	22.94	15.33	24.74	29.05	23.66	6.23	12.78	5.59
C.D. at 5 %	0.65	0.63	0.64	0.67	0.71	0.56	0.49	0.65	0.52
S.Em ±	0.21	0.21	0.21	0.22	0.24	0.18	0.16	0.21	0.17

Figures in parenthesis are Actual values

Effect of herbicide application on Weed Control Efficiency (Table 5-6)

Weed control efficiency was worked out based on weed count/m^2 recorded at 20, 30, 45 and 60 days after spray of herbicides. Among the treatments, herbicide treatment plots recorded higher total weed control efficiency than untreated control. Among the herbicidal treatments, post emergent herbicides recorded higher total weed control efficiency than pre emergent herbicide butachlor 50% EC @1250g a.i./ha. Application of Quinchlorac 180g/l SL recorded higher weed control efficiency among the post emergent herbicides. With respect to dosage of Quinchlorac 180 g/l SL, application of early post emergent herbicide Quinchlorac 180 g/l SL @ 225 g a.i./ha recorded higher weed control efficiency and decreased with decrease in dosage. Ramesh, Y.M. *et al.* (2017) [11] stated that, application of Quinchlorac 250 g/l SC @ 312.5 g a.i./ha recorded significantly higher weed control efficiency at 30 and 60 days after transplanting and which was onpar with the application of Quinchlorac 250 g/l SC @ 250g a.i./ha and Quinchlorac 250 g/l SC @ 187.5g a.i./ha compared to other weed control treatments. It was also conformity with the findings of Amarasinghe *et al.*, (1999) [10] stated that, application of quichlorac @ 500 g/ha recorded higher weed control efficiency in wet seeded rice in mid country region of Srilanka.

Table 5: Species-wise weed control efficiency (%) recorded in different herbicide treatments at 20 and 30 days after spray

Treatments	Monocots							Sedges	Total Weeds (M+S) WCE %
	Echinocloa crusigalli	*Echinocloa colonum*	*Cynodon dactylon*	*Panicum repense*	*Paspalum conjugatum*	*Digitarium sanuinalis*	Average	*Cyperus rotundus*	
	20 Days after spray								
T1	95.9	95.1	80.7	81.2	86.6	92.7	89.4	78.5	85.42
T2	95.9	95.1	88.5	87.4	93.4	92.4	93.4	85.7	90.62
T3	95.9	100.0	92.3	93.8	93.4	100.0	96.7	91.4	94.79
T4	91.6	90.0	88.5	87.4	86.6	92.4	82.0	82.8	88.54
T5	79.1	85.0	84.7	87.4	93.4	92.4	84.4	88.5	85.93
T6	62.5	65.1	57.7	56.3	46.6	53.8	36.1	42.9	38.54
T7	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.00
T8	100.0	100.0	100.0	100.0	100	100.0	100.0	100.0	100.00
	30 Days after spray								
T1	88.9	91.3	77.1	85.0	87.4	94.8	82.8	78.7	81.46
T2	88.9	91.3	80.0	90.0	93.8	94.8	82.8	85.3	82.32
T3	96.3	95.7	85.7	95.1	93.8	94.8	87.3	88.0	87.49
T4	92.6	87.0	82.9	85.0	87.4	94.8	75.2	72.0	74.13
T5	85.2	82.7	77.1	85.0	87.4	94.8	75.2	80.0	76.72
T6	66.7	69.6	51.4	65.1	43.7	63.2	35.0	42.7	37.50
T7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
T8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.00

Table 6: Species-wise weed control efficiency (%) recorded in different herbicide treatments at 45 and 60 days after spray

Treatments	Monocots							Sedges	Total Weeds (M+S) WCE %
	Echinocloa crusigalli	*Echinocloa colonum*	*Cynodon dactylon*	*Panicum repense*	*Paspalum conjugatum*	*Digitarium sanuinalis*	Average	*Cyperus rotundus*	
	45 Days after spray								
T1	82.7	90.3	73.8	80.7	83.3	91.3	77.7	76.9	77.99
T2	82.7	93.5	78.6	88.5	94.5	91.3	80.0	80.8	80.69
T3	89.7	96.8	80.9	88.5	94.5	95.7	85.1	85.9	85.79
T4	86.2	87.1	78.6	88.5	88.8	91.3	71.4	73.1	72.58
T5	79.3	83.8	73.8	84.7	83.3	95.7	72.6	78.2	74.89
T6	51.7	74.2	40.5	57.7	38.8	56.6	34.9	43.6	38.98
T7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	00.0
T8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.00
	60 Days after spray								
T1	74.2	87.9	71.4	76.9	79.0	87.5	77.7	75.0	76.88
T2	77.4	90.9	73.5	88.5	89.4	87.5	78.6	76.2	77.92
T3	83.8	90.9	77.5	88.5	89.4	95.9	84.0	83.3	83.78
T4	80.6	88.2	71.4	84.7	84.2	91.6	69.9	69.0	69.64
T5	74.2	84.8	67.4	80.7	84.2	95.9	68.9	77.5	71.36
T6	51.6	75.7	38.8	57.7	31.6	58.4	30.6	45.3	39.97
T7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
T8	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.00

Effect of herbicide application on grain yield and straw yield (Table 7)

Among the different weed management treatments, herbicidal treatments recorded significantly higher grain yield than untreated control. Among the different herbicidal treatments, Quinchlorac 180 g/l SL @ 225 g a.i/ha has recorded higher grain yield and was found on par with Quinchlorac 180 g/l SL @ 180 g a.i./ha, but significantly superior over other treatments. Whereas, untreated control has recorded significantly lowest yield. The trend was similar with respect to straw yield also. According to Rajkhowa DJ and IC Barua (2007) [12] untreated control has recorded significantly lowest yield. The trend was similar with respect to straw yield. Increased grain and straw yield in herbicide treated plots was

due to higher weed control efficiency. Nadeem Akbar *et al.* (2011) [13] reported higher weed suppression and increase in rice yield by 25 % over control. Reddy *et al.*, (2003) [14] from Hyderabad noticed that *Cyperus spp.*, *Paspalum spp.*, *Caesulia axillaris*, *Rotala densiflora* and *Monocharia vaginalis* caused 28-40% reduction in yield of transplanted rice. Hossain *et al.*, (2010) [15] from Ranchi reported that the weed population was reduced in transplanted rice with higher weed control efficiency resulting in higher grain yield. The significantly higher grain and straw yield were observed in weed free treatment and which was on par with the application of Quinchlorac 250 g/l SC @ 312.5 g a.i./ha, Quinchlorac 250 g/l SC @ 250g a.i./ha and Quinchlorac 250 g/l SC @ 187.5g a.i./ha compared to other weed control treatments (Ramesh YM 2017) [11]. Jayadeva *et al.*, (2009) [16] from Karnataka observed that repeated weeding recorded lower weed dry weight and higher mean grain and straw yield in rice. Whereas, lower grain and straw yield were recorded in weedy check plot. This is due to the higher infestation of weeds.

Table 7: Effect of different herbicide treatments on grain yield and straw yield of transplanted Paddy

Treatments	2013-14	
	Grain Yield (kg/ha)	Straw yield (kg/ha)
T_1 – Quinchlorac 180g/l SL@135 g a.i./ha	7531.0	8202.0
T_2 - Quinchlorac 180g/l SL@180 g a.i./ha	7640.0	8431.3
T_3 - Quinchlorac 180g/l SL@ 225 g a.i./ha	7780.0	8674.7
T_4 – Bispyribac Sodium 10% SC @ 20 g a.i./ha	7543.3	8245.3
T_5 – Cyhalofop Butyl 10 % EC @ 100 g a.i./ha	7548.3	8231.7
T_6 - Butachlor 50 % EC @ 1250 g a.i./ha	7561.7	8001.0
T_7 - Control	6011.7	6760.0
T_8 – Weed free Check	8210.0	9287.3
CV	1.13	2.19
C.D. at 5 %	148.27	315.29
S.Em ±	48.88	103.95

Phytotoxic Effect of herbicide on Rice (Table 8)

The phytotoxicity of herbicides on rice crop is presented in the table 8. No visual symptoms of injury or Phytotoxicity were observed due to any of the treatments during the observation period and hence, recorded higher grain and straw yield.

Table 8: Qualitative assessment of phytotoxicity symptoms (Visual observations) of Quinchlorac 180 g/SL on paddy crop

Treatments	Days after spray				
	1	3	5	7	10
T_1 - Quinchlorac 180g/l SL@ 225 g a.i./ha	0	0	0	0	0
T_2 - Quinchlorac 180g/l SL@ 450 g a.i./ha	0	0	0	0	0
T_3 - Control	0	0	0	0	0

Conclusion

The herbicide, Quinchlorac 180 g/l SL (Facet 180 g/l SL) evaluated during 2013-14 against grassy weeds in transplanted paddy at Krishi Vigyan Kendra, Sirsi Uttara Kannada. The test chemical Quinchlorac 180 g/l SL (Facet 180 g/l SL) found significantly effective for managing weeds in transplanted paddy at an appropriate dosage of 225 g a.i./ha with the solution of 500 l/ha.

Acknowledgement

The authors are thankful to BASF India Limited, Navi Mumbai- 400 705 for providing financial assistant to UAS, Dharwad for conducting the experiment.

References

1. Juraimi AS, Saiful AHM, Uddin MK, Anwar MP, Azmi M. Sustainable weed management in direct seeded rice culture: A review. Aust. J Crop Sci. 2013; 7(7):989-1002.
2. IRRI (International Rice Research Institute). Main weeds of rice in Asia. [http:// www. Knowledge bank.irri.org. 2003, Accessed on 5 July 2011].
3. Balasubramanian P, Palaniappan SP. Principles and practices of Agronomy. Agrobios Publishing co. Pvt. Ltd., New Delhi, 2001, 306-364.
4. Alstorm S. Fundamental of Weed Management in Hot Climatic Peasant Agriculture. Swedish University of Agric. Sci., Uppsala, Sweden, 1990, 50-53.
5. Priyanka Kabdal, Tej Pratap, Vimal Raj Yadav. Weed Management in Transplanted Rice-A Review, Int. J Curr. Microbiol. App. Sci. 2018; 7(4):1660-1669.
6. Singh S, Singh G, Singh VP, Singh AP. Effect of establishment methods and weed management practices on weeds and rice in rice-wheat cropping system. India J of Weed Sci. 2005; 37(1&2):51-57.
7. Janiya JD. Weed management in major crops in the Philippines. Los Baños, Laguna, Philippines: *In Weed Science Society of the Philippines*. Yield losses, major weed species, and suggested management systems in selected major crops: rice, 2002, 17-37.
8. Ramchandra C, Denesh GR, Sydanwarulla. Weed management practices in transplanted rice by using glyphosate. Biennial Conference on "Recent Advances in Weed Science Research-2010", February 25-26, Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhatisgarh), 2010, 68.
9. Patra AK, Halder J, Mishra MM. Chemical weed control in transplanted rice in Hirakud command area of Orissa. Indian J of Weed Sci. 2011; 43(3&4):175-177.
10. Amarasinghe L, Marambe B, Rajpakse RPAD. Effect of Quinchlorac on weed control and productivity of wet seeded rice in the mid region of Sri Lanka. Sri Lankan Journal of Agricultural Sciences. 1999; 36:24-34.
11. Ramesha YM, Manjunatha Bhanuvally, Ashok Kumar Gaddi D, Krishamurthy D, Umesh MR. Int. J Curr. Microbiol. App. Sci. 2017; 6(8):3773-3778.

12. Rajkhowa DJ, Barua IC. Integrated weed management in upland rice in Assam. Indian J Weed Sci. 2007; 39(3&4):176-177.
13. Nadeem Akbar. Eh Sanulla, Khawar Jabran and Mohammad Amjad Ali. Weed management improves yield and quality of direct seeded rice. Aus. J Crop Sci. 2011; 5(6):688-694.
14. Reddy CN, Reddy MD, Devi MP. Effect of cinosulfuron on weeds and transplanted *kharif* rice. Indian J of Weed Sci. 2003; 35(1&2):117-118.
15. Hossain A, Duary B, Mondal DC. Effect of weed management under different methods of rice establishment in the lateritic soil of West Bengal. Biennial Conference on "Recent Advances in Weed Science Research- 2010", Feb. 25-26, 2010, IGKV, Raipur (Chhattisgarh), 63.
16. Jayadeva HM, Bhairappanavar ST, Somashekharappa PR, Rangaswamy BR. Efficacy of azimsulfuron for weed control in transplanted rice. Indian J of Weed Sci. 2009; 41(3&4):172-175.