



E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2020; 9(3): 930-934
Received: 16-03-2020
Accepted: 20-04-2020

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Effect of diuron herbicide on weeds in banana

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Abstract

An experiment was conducted to compare of bio-efficacy of Diuron 80% WP derived from new technical source with the registered formulation of Diuron 80% WP against mixed weed flora (Sedges, broad leaf weed and grassy weed) of Banana at Krishi Vigyan Kendra, Sirsi of University of Agricultural Sciences, Dharwad. The Significant control of grassy weeds, broad leaf weeds and sedges were obtained with Diuron 80% WP (NF) @ 1600 g a.i/ha as compared to other herbicides and untreated control and on par with Diuron 80% WP (EF) @ 1600 g a.i/ha and Diuron 80% WP (NF) @ 1200 g a.i/ha. The experimental results revealed that, higher weed control efficiency of grassy weeds was observed under all the doses of Diuron 80% WP treatments in both the formulations as compared to untreated control. The similar trend was observed with respect to fruit yield of Banana.

Keywords: Diuron, weeds, density, dry weight and Banana

Introduction

Banana is the fourth most important food crop after sorghum, millet and wheat in developing countries with a combined production of more than 90 millions tones (FAO, 1999) [1]. They rank as the second largest fruit crop in the world after citrus. Banana is a shallow rooted crop and requires high moisture levels for best performance and these conditions favours weed growth. During vegetative growth and transition phases, when nutrient availability is crucial in yield determination, weeds could cause severe damage. Weeds by virtue of their high adaptability and faster growth dominate the crop habitat and reduce the yield potential. Weed can cause a yield loss to the tune of 40-70 percent. Therefore, control of weed is must in Banana plantations. The commonly followed practice of weed control in banana plantation is earthing up. Besides earthing up and manual weeding, use of herbicides were also recommended. Diuron, Paraquat, Oxyfluorfen and Glyphosate are the some of the recommended herbicides to manage weeds in Banana.

Diuron 80 WP is an effective general herbicide for the control of many annual and perennial grasses and herbaceous weeds. Diuron is a systemic substituted phenyl urea herbicide. Diuron is easily taken up from soil solution by the root system of plants and rapidly translocated into stems and leaves by the transpiration system, moving primarily via the xylem. Diuron primarily functions by inhibiting the Hill reaction in photosynthesis, limiting the production of high-energy compounds such as adenosine triphosphate (ATP) used for various metabolic processes (Hess and Warren, 2002) [2]. Diuron is a broad-spectrum residual herbicide registered for pre-emergent and post-emergent control of both broad leaf and annual grassy weeds. When diuron is used on pre-emergent weeds, it allows seeds to germinate normally, but causes them to loose their green color, after which they soon die of starvation (Ferrell *et al.*, 2004) [3]. In this context, the new formulation Diuron 80 WP was tested to find out its bio-efficacy in banana crop.

Material and Methods

An experiment was conducted to compare of bio-efficacy of Diuron 80%WP derived from new technical source with the registered formulation of Diuron 80% WP against mixed weed flora (Sedges, broad leaf weed and grassy weed) of Banana at Krishi Vigyan Kendra, Sirsi of University of Agricultural Sciences, Dharwad during 2014-15. Location of trial was in farmer field of Ganapati Telegu, Ramapura village of Sirsi taluk (Uttara Kannada District) lies in the hill zone of Karnataka. It has an attitude of 619 m with latitude of 140 26' N and longitude of 740 50' E.

The new herbicide formulation Diuron 80 WP (Diuron % WP) was evaluated for its bio-efficacy on weed flora in Banana and compared with existing formulation (EF) of Diuron 80% WP. (800, 1200 and 1600 g a.i./ha). The efficacy of this test herbicide formulation was compared with existing formulation of Diuron 80 WP herbicide (800 and 1600 g a.i./ha). These herbicide treatments were compared with untreated control and weed free check treatment.

The experiment was laid out in Randomized Block Design (RBD) with three replication. The plot size was 6.0 m X 8.0 m. Neem cake (1.0 kg), farm yard manure (12 kg) and top soil were filled in fit as per the package of practice. Banana cultivar Yelakki (Yelakki Mitli) was used in the study. The cow dung and carbendazim treated suckers were planted with the spacing of 1.8 m x 1.8 m with pit size of 45 x 45 x 45 cm on 12th of August, 2014. Nutrients were supplied to the crop as per recommendations. Necessary plant protection and water management practices were followed as per the requirements. The crop was harvested at maturity to record fruit yield.

Herbicide application

The test herbicide *viz.*, New formulation and existing formulation of Diuron 80% WP were sprayed 10 days after planting as a pre-emergent herbicide as per the treatments. High volume (Knapsack) sprayer fitted with WFN 20 nozzle was used for spraying. The spray volume used was 625 liters per hectare. Herbicide was sprayed on wetted soil and moved backward direction. No weed management practiced were done in control treatment plot. Whereas, in weed free check, regular hand weeding was done in order keep plot free from weeds.

Observations recorded in weed and banana

Weed Bio-metric observations

- **Weed density:** Species wise grassy weeds, Broad leaf weeds (BLWs) and sedges populations were recorded at 30 & 60 days after application (DAA) in three fixed one meter square area.
- **Weed dry weight:** The counted weeds were removed from the plots at 30 and 60 DAA and air dried for few days and then kept in hot air oven at 60 ° C for further drying. Then recorded the weight of each dried sample of grasses, BLWs and sedges and expressed in g / m².
- **Weed Control Efficiency (WCE):** It is calculated by the following formula and recorded in percentage at 30 & 60 days after application.

$$\% \text{ WCE} = \frac{\text{Weed dry wt. in the untreated plot} - \text{weed dry wt. in the treated plot}}{\text{Weed dry wt. in the untreated plot}} \times 100$$

Crop yield Observations

The net plot fruit yield was recorded and converted to yield per hectare (t/ha)

Result and Discussion

1. On weeds

The weed flora, data on weed density per meter square, weed dry weight (g/m²) and weed control efficiency (%) in Banana as influenced by different herbicidal application is presented in Table 1 to 6.

A. Weed flora

Table 1: Weeds flora observed in the experimental field

Grassy weeds	Broad leaved weeds	Sedges
<i>Commelina benghalensis</i>		
<i>Digitaria spp.</i>	<i>Amaranthus spp.</i>	
<i>Dactyloctenium spp.</i>	<i>Ludwigia parviflora</i>	
<i>Chloris barbata</i>	<i>Alternanthera sessilis</i>	<i>Cyperus iria</i>
<i>Eragrostis zeylenica</i>	<i>Portuleca oleraceae</i>	
<i>Cynodon dactylon</i>		
<i>Panicum repense</i>		

B. Species wise Weed density and weed dry weight

Effect of weed control treatments on grassy weeds

The Experimental results indicated that, Species wise grass weed density (Table 2) was reduced due to herbicidal treatments. Significant reduction of grassy weed population per square meter was observed under all the doses of Diuron 80% WP as compared to untreated control. Among different dosages herbicidal treatments, application of Diuron 80% WP @ 1600 g a.i./ha recorded significantly lower grassy weeds as compared to Diuron 80% WP @ 800 g.a.i./ha at 30 and 60 days after application (DAA) and was on par with the application of Diuron 80% WP @ 1200 g.a.i./ha. Among the formulations, new formulation of Diuron 80% WP lowered the grassy weed populations than existing Diuron 80% WP, but on par in respective level of dosages. Whereas, higher grassy weed counts were observed in control plot. However, there were no weeds observed in weed free check (Hand weeding) treatment. Similar trend was observed with respect to total grassy weed density (Table 4) and the dry weight of grassy weeds (Table 5). Similar report was obtained by Ahmed Hassan Abdel aziz (2003) [4]. The best weed control was recorded with Diuron at (1600 g a.i./ha). This is in agreement with Parech Chandra Das and Miara, A.K., (1977) [5] who reported that Diuron (2.0 Kg) was found to be effective in controlling weeds.

Effect of weed control treatments on Broad leaf weeds (BLWs)

The herbicidal treatments significantly controlled species wise BLWs densities per square meter (Table 3). The Significant reduction of BLWs population per square meter was observed under all the doses of Diuron 80% WP as compared to untreated control. Among different dosages of herbicidal treatments, application of Diuron 80% WP @ 1600 g a.i./ha recorded significantly lower BLWs as compared to Diuron 80% WP @ 800 g.a.i./ha at 30 and 60 DAA and was on par with the application of Diuron 80% WP @ 1200 g.a.i./ha. Among the formulations, new formulation of Diuron 80% WP lowered BLWs population than existing Diuron 80% WP, but on par in respective level of dosages. Similar results were reported with respect to total BLWs density (Table 4) and total dry weight of BLWs (Table 5). Considering the effect of herbicides on weeds, the assessment of weed density and biomass indicated a significant reduction in weed density and biomass for all tested herbicides at different rates. According to Challa *et al.* (1996) [6] Diuron (2.0 Kg/ha) was recommended for the control of weeds in banana. All herbicides treatments at different rates showed less weed density and weed dry

weight BLWs /m² compared to the weedy control. This could be merely due to the effectiveness of the used herbicides in controlling such weeds (Mohamed, 1995)^[7].

Effect of weed control treatments on Sedges

The Experimental results showed that, sedges density per square meter were reduced due to herbicidal treatments (Table 3). Significant reduction of sedges population per square meter was observed under all the doses of Diuron 80% WP as compared to untreated control. Among different dosages of herbicidal treatments, application of Diuron 80% WP @ 1600 g a.i./ha recorded significantly lower sedges as compared to Diuron 80% WP @ 800 g.a.i./ha at 30 and 60 DAA and was on par with the application of Diuron 80% WP @ 1200 g.a.i./ha. Among the formulations, new formulation of Diuron 80% WP lowered sedges population than existing Diuron 80% WP, but on par in respective level of dosages. Same trend was appeared in case of dry weight sedges also (Table 5). Diuron translocated via the apoplastic system, whether absorption has occurred via the root. Inhibition of photosynthesis is generally considered to be the primary, though not the necessarily the only mechanism of action (Roberts, 1982)^[8].

C. Weed control Efficiency (%)

Effect of weed control treatments on weed control efficiency of grassy weeds, BLWs and Sedges

The higher weed control efficiency of grassy weeds, BLWs and sedges was observed under all the doses of Diuron 80% WP treatments in both the formulations as compared to untreated control (Table 6). Among different dosages of herbicidal treatments, application of Diuron 80% WP @ 1600 g a.i./ha recorded higher weed control efficiency of grassy weeds at both 30 (89.04%) and 60 DAA (75.79%) as compared to Diuron 80% WP @ 800 g.a.i./ha and was on par with the application of Diuron 80% WP @ 1200 g.a.i./ha. Among different herbicidal formulations, application of new formulation Diuron 80% WP @ 1600 g a.i./ha recorded higher weed control efficiency of grassy weeds at 30 DAA (89.13%) followed by existing formulation Diuron 80% WP @ 1600 g a.i./ha, new formulation Diuron 80% WP @ 1200 g a.i./ha (84.19%) and 800 g.a.i./ha (79.52%). Similar trend was observed at 60 DAA also (table 6). Weed control efficiency of BLWs, sedges and total weed (Table 6) were also followed

the same trend at both 30 DAA and 60 DAA. Increased weed control efficiency in herbicidal treatments was due to reduced weed dry weight weeds of grassy, BLWs and sedges. Similar findings were reported by Ahmed Hassan Abdel aziz, (2003)^[4].

In general, among different weed groups (Grassy weeds, BLWs and Sedges), weed control efficiency was higher in broad leaf weeds followed by grassy weeds and sedges at both 30 and 60 DAA. Among the formulations, new formation Diuron 80% WP recorded higher weed control efficiency than existing formulation of Diuron 80% WP at their respective dosages (Table 6).

2. On crop

Effect of weed control treatments on Fruit Yield of Banana

The significantly higher fruit yield (41.13 t/ha) was observed in weed free treatment and which was *onpar* with treatment receiving Diuron 80% WP @ 1600 g a.i./ha. Among different dosages of herbicidal treatments, application of Diuron 80% WP @ 1600 g a.i./ha recorded higher fruit yield (40.21 t/ha) as compared to Diuron 80% WP @ 800 g.a.i./ha and was on par with the application of Diuron 80% WP @ 1200 g.a.i./ha (37.21 t/ha). Among the different formulations, New formulation Diuron 80% WP @ 1600 g.a.i./ha recorded significantly higher fruit yield (40.21 t/ha) and on par with existing formulation Diuron 80% WP @ 1600 g.a.i./ha (38.15 t/ha) and new formulation Diuron 80% WP @ 1200 g.a.i./ha (37.33 t/ha). *Whereas*, significantly lower fruit yield (23.45 t/ha) was recorded in the untreated control (Table 6). The increased in the fruit yield in weed control treatments was due control of weeds. Results of Ahmed Hassan Abdel aziz, (2003)^[4] showed that significant increases in banana yield parameters which were sometimes comparable to the herbicides with their high rates. The application of the herbicide Diuron was effective in the control of all weeds. This afforded a good chance for the banana plant to make use of the available resources. It was observed that significant increase in fruit yield of banana was found by diuron at different rates of different formulations and hand weeding treatment as compared to the control. The results are in agreement with Nybe *et al.*, (1991)^[9] and Mishra, A.K., (1984)^[10] who reported similar results.

Table 2: Effect of Weed control treatments on species wise weed density of grassy weeds in Banana

Treatments	<i>Commelina benghalensis</i>		<i>Digitaria spp.</i>		<i>Dactyloctenium spp.</i>		<i>Chloris barbata</i>		<i>Eragrostis zeylenica</i>		<i>Cynodon dactylon</i>		<i>Panicum repense</i>	
	30 DAA	60 DAA	30 DAA	60 DAA	30 DAA	60 DAA	30 DAA	60 DAA	30 DAA	60 DAA	30 DAA	60 DAA	30 DAA	60 DAA
T ₁	1.82 (2.33)	2.31 (4.33)	1.52 (1.33)	2.08 (3.33)	1.52 (1.33)	2.08 (3.33)	1.49 (1.22)	2.21 (3.89)	1.49 (1.22)	2.15 (3.66)	1.75 (2.11)	2.96 (7.78)	1.60 (1.55)	2.28 (4.22)
T ₂	1.73 (2.00)	2.18 (3.78)	1.24 (0.55)	1.88 (2.55)	1.41 (1.00)	1.94 (2.77)	1.37 (0.89)	2.10 (3.44)	1.41 (1.00)	2.08 (3.33)	1.60 (1.55)	2.74 (6.55)	1.45 (1.11)	2.03 (3.11)
T ₃	1.48 (1.22)	2.02 (3.11)	1.20 (0.44)	1.76 (2.11)	1.29 (0.66)	1.76 (2.11)	1.20 (0.44)	1.94 (2.77)	1.24 (0.55)	1.85 (2.44)	1.45 (1.11)	2.46 (5.11)	1.29 (0.66)	1.88 (2.55)
T ₄	1.85 (2.44)	2.35 (4.55)	1.52 (1.33)	2.13 (3.55)	1.53 (1.33)	2.08 (3.33)	1.56 (1.44)	2.26 (4.11)	1.52 (1.33)	2.18 (3.77)	1.76 (2.11)	3.00 (7.99)	1.63 (1.66)	2.35 (4.55)
T ₅	1.68 (1.88)	2.15 (3.66)	1.24 (0.55)	1.85 (2.44)	1.40 (0.99)	1.90 (2.66)	1.37 (0.89)	2.08 (3.33)	1.37 (0.89)	2.00 (3.00)	1.49 (1.22)	2.53 (5.44)	1.32 (0.77)	2.00 (3.00)
T ₆	3.38 (10.44)	3.94 (14.55)	2.88 (7.33)	3.49 (11.22)	2.94 (7.66)	3.55 (11.66)	2.76 (6.67)	3.60 (12.00)	2.84 (7.11)	3.51 (11.44)	2.61 (5.88)	3.82 (13.71)	2.68 (6.22)	3.38 (10.44)
T ₇	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)
C.D. @ 5%	0.28	0.28	0.21	0.26	0.20	0.29	0.21	0.26	0.22	0.23	0.25	0.43	0.24	0.25
CV	8.64	6.89	7.61	7.18	7.23	7.91	7.62	6.70	7.80	6.17	8.43	9.13	8.77	6.63
S.Em +	0.09	0.09	0.07	0.08	0.07	0.09	0.07	0.08	0.07	0.08	0.08	0.14	0.08	0.08

Figures in parenthesis are Actual values

Table 3: Effect of Weed control treatments on species wise weed density of Broad leaved and sedges(BLWs) weeds in Banana

Treatments	<i>Amaranthus spp.</i>		<i>Ludwigia parviflora</i>		<i>Alternanthera sessilis</i>		<i>Portulaca oleraceae</i>		<i>Cyperus iria</i>	
	30 DAA	60 DAA	30 DAA	60 DAA	30 DAA	60 DAA	30 DAA	60 DAA	30 DAA	60 DAA
T ₁	1.41 (1.00)	2.05 (3.22)	1.52 (1.33)	2.05 (3.22)	1.63 (1.66)	2.11 (3.44)	1.44 (1.11)	2.18 (3.77)	2.33 (4.44)	2.85 (7.11)
T ₂	1.33 (0.77)	1.94 (2.77)	1.33 (0.77)	1.91 (2.66)	1.41 (1.00)	2.00 (3.00)	1.37 (0.89)	2.03 (3.11)	2.23 (4.00)	2.66 (6.11)
T ₃	1.10 (0.22)	1.66 (1.77)	1.15 (0.33)	1.76 (2.11)	1.20 (0.44)	1.73 (2.00)	1.24 (0.55)	1.79 (2.22)	1.97 (2.89)	2.45 (5.00)
T ₄	1.49 (1.22)	2.07 (3.33)	1.56 (1.44)	2.13 (3.55)	1.63 (1.66)	2.11 (3.44)	1.52 (1.33)	2.18 (3.77)	2.42 (4.89)	2.88 (7.33)
T ₅	1.28 (0.67)	1.91 (2.67)	1.24 (0.55)	1.88 (2.55)	1.35 (0.89)	1.94 (2.77)	1.41 (1.00)	1.97 (2.88)	2.18 (3.77)	2.54 (5.44)
T ₆	3.26 (9.66)	3.82 (13.66)	3.14 (8.89)	3.65 (12.23)	3.00 (8.00)	3.49 (11.22)	2.88 (7.33)	3.44 (10.89)	3.31 (10.00)	4.08 (15.67)
T ₇	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)
C.D. @ 5%	0.27	0.32	0.27	0.28	0.28	0.27	0.17	0.27	0.31	0.33
CV	9.65	8.59	9.62	7.55	9.86	7.46	6.09	7.31	7.88	6.95
S.Em +	0.09	0.10	0.09	0.09	0.09	0.09	0.05	0.09	0.10	0.11

Figures in parenthesis are Actual values.

Table 4: Effect of Weed control treatments on Total weed density/m² in Banana

Treatments	Grassy weeds		BLWs		Sedges		Total weeds	
	30 DAA	60 DAA	30 DAA	60 DAA	30 DAA	60 DAA	30 DAA	60 DAA
T ₁	3.39 (11.09)	5.53 (30.53)	2.30 (5.10)	3.71 (13.65)	2.28 (4.44)	2.85 (7.11)	4.64 (20.62)	7.23 (51.29)
T ₂	3.01 (8.09)	5.15 (25.53)	2.02 (3.43)	3.54 (11.54)	2.23 (4.00)	2.66 (6.11)	4.06 (15.52)	6.65 (43.18)
T ₃	2.55 (5.08)	4.65 (20.20)	1.59 (1.54)	3.30 (8.09)	2.08 (2.89)	2.45 (5.00)	3.24 (9.50)	5.85 (33.30)
T ₄	3.49 (11.63)	5.60 (31.86)	2.51 (5.66)	3.86 (14.10)	2.42 (4.89)	2.88 (7.33)	4.81 (22.18)	7.37 (53.29)
T ₅	2.86 (7.19)	4.95 (23.53)	2.02 (3.10)	3.44 (10.87)	2.46 (3.77)	2.54 (5.44)	3.88 (14.07)	6.39 (39.84)
T ₆	7.23 (51.31)	9.27 (85.02)	5.90 (33.88)	7.01 (48.10)	3.31 (10.00)	4.08 (15.67)	9.81 (95.18)	12.24 (148.78)
T ₇	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)
C.D. @ 5%	0.81	0.83	0.33	0.46	0.32	0.38	0.83	0.94
CV	13.56	9.06	7.42	6.94	8.04	8.20	10.33	7.96
S.Em +	0.26	0.27	0.11	0.15	0.10	0.12	0.27	0.31

Figures in parenthesis are Actual values.

Table 5: Effect of Weed control treatments on Dry weight of weeds (g/m²) in Banana

Treatments	Total Grassy weeds dry weight		Total BLWs dry weight		Total Sedges dry weight		Total dry weight of weeds	
	30 DAA	60 DAA	30 DAA	60 DAA	30 DAA	60 DAA	30 DAA	60 DAA
T ₁	2.39 (4.71)	6.32 (38.99)	1.58 (1.50)	4.02 (15.17)	1.90 (2.59)	3.07 (8.48)	3.13 (8.81)	7.93 (61.97)
T ₂	2.15 (3.64)	5.87 (33.53)	1.44 (1.06)	3.77 (13.21)	1.74 (2.02)	2.86 (7.18)	2.77 (6.72)	7.41 (52.28)
T ₃	1.87 (2.52)	5.29 (27.09)	1.24 (0.54)	3.34 (10.20)	1.65 (1.73)	2.63 (5.92)	2.40 (4.79)	6.75 (44.53)
T ₄	2.45 (5.03)	6.41 (40.15)	1.69 (1.84)	4.12 (16.03)	1.90 (2.60)	3.10 (8.62)	3.24 (9.47)	8.11 (64.80)
T ₅	2.05 (3.22)	5.65 (31.06)	1.37 (0.87)	3.59 (11.92)	1.73 (2.00)	2.73 (6.48)	2.70 (6.31)	7.17 (50.45)
T ₆	4.90 (23.02)	10.60 (111.85)	3.58 (11.91)	8.93 (78.86)	2.99 (8.00)	4.77 (21.93)	6.63 (42.93)	14.59 (212.64)
T ₇	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)
C.D. @ 5%	0.31	0.69	0.25	0.56	0.21	0.30	0.40	1.02
CV	7.37	6.62	8.40	7.63	6.34	5.94	7.21	7.55
S.Em +	0.10	0.22	0.08	0.18	0.07	0.10	0.13	0.33

Figures in parenthesis are Actual values.

Table 6: Effect of Weed control treatments on Weed control efficiency (WCE) % and Fruit yield in Banana

Treatments	Total Grassy weeds WCE %		Total BLWs WCE %		Total Sedges WCE		Total weeds WCE%		Fruit yield (t/ha)
	30 DAA	60 DAA	30 DAA	60 DAA	30 DAA	60 DAA	30 DAA	60 DAA	
T ₁	79.52	65.14	87.42	80.76	67.50	61.36	78.15	69.09	34.35
T ₂	84.19	70.02	91.09	83.25	74.79	67.28	83.36	73.52	37.33
T ₃	89.04	75.79	95.50	87.07	78.33	73.03	87.62	78.63	40.21
T ₄	78.13	64.10	84.57	79.66	67.46	60.72	76.72	68.16	33.11
T ₅	85.90	72.23	92.75	84.89	75.00	70.48	84.55	75.87	38.15
T ₆	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.45
T ₇	99.99	100.00	100.00	100.00	100.00	100.01	100.00	100.00	41.13
C.D. @ 5%	--	--	--	--	--	--	--	--	4.54
CV	--	--	--	--	--	--	--	--	7.21
S.Em +	--	--	--	--	--	--	--	--	1.47

Conclusion

Among the different doses of Diuron 80% WP (NF) tested as pre-emergent herbicide in Banana, application of new formulation of Diuron 80% WP @ 1600 g.a.i/ha was found to be more effective in controlling of grassy weeds, BLWs and sedges followed by existing formulation of Diuron 80% WP @ 1600 g.a.i/ha and New formulation of Diuron 80% WP @ 1200 g.a.i/ha.

Acknowledgement

The study was sponsored by Lanxess India Pvt Ltd., Maharashtra to University of Agricultural Sciences, Dharwad.

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