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**Kunal Narwal**

Department of Agronomy,  
University of Agricultural Sciences,  
Dharwad, Karnataka, India

**BS Yenagi**

Department of Agronomy,  
University of Agricultural Sciences,  
Dharwad, Karnataka, India

## Influence of herbicides on yield and yield parameters of groundnut in rice-groundnut system under coastal zone of Karnataka

**Kunal Narwal and BS Yenagi**

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### Abstract

A field experiment was conducted at Agricultural Research Station, Kumta, Uttara Kannada district of University of Agricultural Sciences, Dharwad to know the impact of herbicide on yield and yield parameters of groundnut in rice-fallow groundnut system. A field experiment was layout in a RCBD design having nine treatments with three replications. The results concluded that, significantly higher number of pods per plant (14.4), pod weight per plant (12.4 g), sound matured kernel (79.2%) and test weight (33.1 g) and kernel yield (1294 kg ha<sup>-1</sup>) was observed in application of pendimethalin 30% E.C. @ 1.5 kg ha<sup>-1</sup> fb one hand weeding at 25 DAS and however on par with T<sub>6</sub>: pendimethalin 30% E.C. @ 1.5 kg ha<sup>-1</sup> fb quizalofop-p-ethyl 5% E.C. @ 50 g ha<sup>-1</sup> 20-30 DAS. Whereas, significantly lower number of pods per plant (8.1) and pod weight per plant (8.1 g), sound matured kernel (74.8%), test weight (28.5 g) and kernel yield (777 kg ha<sup>-1</sup>) was observed in un-weeded plot.

**Keywords:** Yield parameters, pod yield, hand weeding, groundnut

### Introduction

Groundnut is most important source of edible oil and vegetable protein. In India, the groundnut is cultivated an area about 8.59 m ha. With a production of 6.59 M.tonnes and average yield of 1764 kg ha<sup>-1</sup> (Anon., 2015) [1]. The major groundnut growing districts in *rabi* season in Karnataka are Udupi and Uttara kannada. To meet the growing demand of oilseed production the groundnut cultivation has been extended to *rabi*/summer or post rainy season in AP, TN, Orissa, Kerala, West Bengal, Karnataka and Jharkhand, where in most of the land remains fallow after *khari* rice. Cultivation of pulses (Green gram and black gram) in rice-fallow is a common practice in coastal areas of Andhra Pradesh, Karnataka and Tamil Nadu. Groundnut is one of the alternatives to these pulses in rice-fallows under coastal areas.

Groundnut is grown all season in India. The average yield of groundnut is very mainly due to changes in monsoon, non-availability of irrigation facilities, poor nutrient and weed infestation, non-adoption of improved agro technologies. Among these, weed infestation is one of the major factors responsible for lower yield. During the initial stage of crop growth, it encounters severe weed problem, because initially slow growth of crop after words, shoot growth is very less when compared to the root development. The weeds grow very rapidly competing with natural resources like water, nutrients, light and also transpire lot of water from the soil. The initially up to 4 to 8 weeks are critical period of crop weed competition during the crop period (Jat *et al.*, 2011) [3]. In India, 15 to 75 per cent loss of groundnut production due to weeds (Sathya *et al.*, 2013) [7]. Therefore weed control during initial stages is very crucial role for higher yield.

The lot of limitations in physical method of weed control are un-availability of labour during weed infestation, cost labour is too high and un-fourable condition during critical period. Under such conditions, chemical control of weed management forms an excellent alternative to manual and mechanical weed control methods.

Further, lack of pre-emergence application of herbicide activity have longer period resulted in weed growth for that go for hand weeding at 25-40 DAS. Under such situation go for post emergent application of herbicide were suggested during critical stages of crop growth.

**Corresponding Author:**

**Kunal Narwal**

Department of Agronomy,  
University of Agricultural Sciences,  
Dharwad, Karnataka, India

Hence, there is a need to identify the effective chemicals on yield and yield attributes of groundnut in rice-fallow groundnut system.

### Materials and Methods

A field experiment was conducted at ARS Kumta, Uttar Kannada, UAS, Dharwad (Karnataka) Kumta is located at 14.2554° N latitude and 74.2516° E longitude and at an altitude of 2 m above the mean sea level. This research station comes under Coastal Zone (Zone 10) of Karnataka which receives average rainfall of 3588 mm. The experiment was laid out in a Randomized Block Design having 9 treatments with 3 replications. Treatment details as follows., T<sub>1</sub>: Un-weeded check, T<sub>2</sub>: Weed free check, T<sub>3</sub>: Two hand weeding (At 20 and 40 DAS), T<sub>4</sub>: pendimethalin 30% E.C. @ 1.5 kg ha<sup>-1</sup> (PE) fb one hand weeding at 25 DAS, T<sub>5</sub>: oxyfluorfen 23.5% E.C. @ 200 g ha<sup>-1</sup>(PE) fb one hand weeding at 25 DAS, T<sub>6</sub>: pendimethalin 30% E.C. @ 1.5 kg ha<sup>-1</sup> (PE) fb quizalofop-p-ethyl 5% E.C. @ 50 g ha<sup>-1</sup> 20-30 DAS (POE), T<sub>7</sub>: pendimethalin 30% E.C. @ 1.5 kg ha<sup>-1</sup> (PE) fb imazethapyr 10% S.L. @ 75 g ha<sup>-1</sup> 20-30 DAS (POE), T<sub>8</sub>: pendimethalin 30% E.C. @ 1.5 kg ha<sup>-1</sup> (PE) fb oxyfluorfen 23.5% E.C. @ 100 g ha<sup>-1</sup> at 20-30 DAS (POE), and T<sub>9</sub>: pendimethalin 30% E.C. @ 1.0 kg ha<sup>-1</sup> (PE) fb one hand weeding at 25 DAS. Hand weeding was done as per treatments. In weed free plot through crop growth period weed free condition was

### Yield parameters and yield

Number of pods per plant

The number of pods per plant was counted from five tagged plant in every treatments and expressed in number of pods per plant.

### Weight of pods per plant

The weight of five plants were selected and picked separately and its pod weight per plant recorded.

### Hundred kernel weight

Weight of hundred sound kernel of the net plot was recorded and expressed in gram

### Sound matured kernel

100 g kernel from each treatments in a random manner for well-developed and shriveled were separated and counted.

### Pod yield

The pod yield in each treatments were dried to constant weight and expressed as pod yield in kg ha<sup>-1</sup>.

**Kernel yield:** Kernel yield for each plot was obtained based on shelling percentage and dry pod yield (kg ha<sup>-1</sup>).

$$\text{Kernel yield (kg ha}^{-1}\text{)} = \frac{\text{Shelling per cent} \times \text{dry pod yield (kg ha}^{-1}\text{)}}{100} \times 100$$

**Harvest index:** The formula of harvest index was given below

$$\frac{\text{Pod yield (kg/ha)}}{\text{Pod yield (kg/ha)} + \text{Haulm yield (kg/ha)}} \times 100$$

### Results and Discussions

The yield parameters of groundnut were differed significantly due to different weed management practices are presented in Table 1.

Among the different weed management practices, significantly higher pod weight (12.4 g plant<sup>-1</sup>), number of pods per plant (14.4), sound matured kernel (79.2%) and test weight (33.1 g) was recorded with pre-emergence application of pendimethalin 30% E.C. @ 1.5 kg/ha followed by one hand weeding at 25 DAS. However, it was on par with pendimethalin 30% E.C. at 1.5 kg/ha followed by quizalofop-p-ethyl 5% E.C. @ 50 g/ha at 20-30 DAS). However, weed free plot was recorded higher yield parameters as compared to other treatments. Whereas, significantly lower weight of pods per plant (8.10 g), number of pods per plant (8.1), sound matured kernel (74.8%) and test weight (28.5 g) was recorded in un-weeded plot. The similar results were in conformity with those obtained by Sumathi *et al.* (2000) [8] and Chaitanya *et al.* (2013) [2]. Number of pods per plant, pod weight per plant and test weight were significantly less with the un-weeded check than all other treatments which might be due to heavy weed competition which affected plant height and dry matter production resulted in lower yield parameters. Higher yield parameters was observed with pendimethalin 30% EC @ 1.5 kg ha<sup>-1</sup> fb one hand weeding at 25 DAS, followed by pendimethalin 30% E.C. @ 1.5 kg ha<sup>-1</sup> fb quizalofop-p-ethyl 5% E.C. @ 50 g ha<sup>-1</sup> 20-30 DAS treatments might be due to no weed free competition created by the application of herbicides at critical period of weed competition which ultimately reflected in yield attributing characters.

### Pod yield, kernel yield and harvest index

The groundnut yield data were presented in (Table 2). Among the different treatments, pre-emergence application of pendimethalin 30% E. C at 1.5 kg/ha followed by one hand weeding at 25 DAS recorded significantly higher pod yield (22255 kg/ha), kernel yield (1294 kg/ha) and harvest index (0.29). The similar reports were noted by Sailaja *et al.*, (2002) [5] and Sagvekar *et al.*, (2015) [4]. The significantly lower pod yield (1453kg/ha), kernel yield (777 kg/ha) and harvest index (0.25) was observed with un-weeded plot as compared to other treatments and its accounted for 35.6 per cent reduction when compared to pre-emergence application of pendimethalin 30% E.C at 1.5 kg/ha at 25 DAS. The lower yield which might be due to higher weed density, weed dry matter production, which depleted the nutrients and moisture from the soil, which are the most growth and yield limiting factors of crops. The higher yield which might be due to reduction in weed density, weed dry matter resulted in higher growth attributes and these improved growth attributes increases the yield attributes which in turn increased pod and kernel yield of groundnut. The similar results were close conformed with the findings of Sasikala *et al.* (2006) [6] and Chaitanya *et al.* (2013) [2].

**Table 1:** Pod weight, number of pods, sound mature kernel, and test weight of groundnut as influenced by weed management treatments

Treatments		Pod weight plant <sup>-1</sup> (g)	Number of pods plant <sup>-1</sup>	Sound matured kernel (%)	Test weight (g)
T <sub>1</sub>	Un-weeded check	8.1	8.1	74.8	28.5
T <sub>2</sub>	Weed free check	13.0	15.0	80.3	34.1
T <sub>3</sub>	Two hand weeding (At 20 and 40 DAS)	10.0	11.7	76.6	29.2
T <sub>4</sub>	Pendimethalin 30% E.C. @ 1.5 kg ha <sup>-1</sup> (PE) fb One hand weeding at 25 DAS (POE)	12.4	14.4	79.2	33.1
T <sub>5</sub>	Oxyfluorfen 23.5% E.C. @ 200 g ha <sup>-1</sup> (PE) fb One hand weeding at 25 DAS	9.0	9.9	75.5	28.9
T <sub>6</sub>	Pendimethalin 30% E.C. @ 1.5 kg ha <sup>-1</sup> (PE) fb Quizalofop-p-ethyl 5% E.C. @ 50 g ha <sup>-1</sup> 20- 30 DAS (POE)	11.1	13.0	78.0	31.8
T <sub>7</sub>	Pendimethalin 30% E.C. @ 1.5 kg ha <sup>-1</sup> (PE) fb Imazethapyr 10% S.L. @ 75 g ha <sup>-1</sup> at 20- 30 DAS (POE)	11.0	13.0	76.8	31.3
T <sub>8</sub>	Pendimethalin 30% E.C. @ 1.5 kg ha <sup>-1</sup> (PE) fb Oxyfluorfen 23.5% E.C. @ 100 g ha <sup>-1</sup> at 20-30 DAS (POE)	9.4	10.1	75.6	29.1
T <sub>9</sub>	Pendimethalin 30% E.C. @ 1.0 kg ha <sup>-1</sup> (PE) fb One hand weeding at 25 DAS.	10.5	12.7	76.7	30.7
	S.Em.±	0.7	0.7	3.1	1.4
	C.D. at 5%	2.10	2.0	NS	NS

Note: DAS; Days after sowing, HW; Hand weeding, fb; Followed by, PE; Pre-emergence application, POE; Post emergence application, SL; Soluble liquid

**Table 2:** Pod yield, kernel yield and harvest index of groundnut as influenced by weed management treatments

Treatments		Pod yield (kg ha <sup>-1</sup> )	Kernel yield (kg ha <sup>-1</sup> )	Harvest index
T <sub>1</sub>	Un-weeded check	1,453	777	0.25
T <sub>2</sub>	Weed free check	2,408	1,412	0.29
T <sub>3</sub>	Two hand weeding (At 20 and 40 DAS)	1,974	1,080	0.27
T <sub>4</sub>	Pendimethalin 30% E.C. @ 1.5 kg ha <sup>-1</sup> (PE) fb One hand weeding at 25 DAS (POE)	2,255	1,294	0.29
T <sub>5</sub>	Oxyfluorfen 23.5% E.C. @ 200 g ha <sup>-1</sup> (PE) fb One hand weeding at 25 DAS	1,633	881	0.27
T <sub>6</sub>	Pendimethalin 30% E.C. @ 1.5 kg ha <sup>-1</sup> (PE) fb Quizalofop-p-ethyl 5% E.C. @ 50 g ha <sup>-1</sup> 20- 30 DAS (POE)	2,145	1,201	0.27
T <sub>7</sub>	Pendimethalin 30% E.C. @ 1.5 kg ha <sup>-1</sup> (PE) fb Imazethapyr 10% S.L. @ 75 g ha <sup>-1</sup> at 20- 30 DAS (POE)	2,133	1,181	0.28
T <sub>8</sub>	Pendimethalin 30% E.C. @ 1.5 kg ha <sup>-1</sup> (PE) fb Oxyfluorfen 23.5% E.C. @ 100 g ha <sup>-1</sup> at 20-30 DAS (POE)	1,688	907	0.28
T <sub>9</sub>	Pendimethalin 30% E.C. @ 1.0 kg ha <sup>-1</sup> (PE) fb One hand weeding at 25 DAS.	2,023	1,092	0.27
	S.Em.±	98	39	0.01
	C.D. at 5%	293	119	0.02

Note: DAS; Days after sowing, HW; Hand weeding, fb; Followed by, PE; Pre-emergence application, POE; Post emergence application, SL; Soluble liquid

### Summary and Conclusion

The results concluded that, significantly higher yield and yield parameters were observed with pre-emergence application of pendimethalin 30% E.C. @ 1.5 kg ha<sup>-1</sup> (PE) fb one hand weeding at 25 DAS. However, it was at par with application of pendimethalin 30% E.C. @ 1.5 kg/ha followed by quizalofop-p-ethyl 5% E.C. @ 50 g/ha at 20-30 DAS in rice-fallow groundnut under Coastal Zone of Karnataka.

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