

Effect of Sowing Time and Seed Rate on Quality Parameters of Root of Ashwagandha (*Withania somnifera* Dunal)

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Abstract

The experiment was laid out in split plot design with three replications. The treatments consist of six sowing time (1st and 15th July, 1st and 15th august, 1st and 15th September) and four seed rate (2.5, 5.0, 7.5 and 10 kg /ha). The maximum root length of root was recorded in the treatment 15th July sowing with 5 kg/ha seed rate, which was at par with the treatments 15th july sowing with 7.5 kg/ha seed rate, 1st august sowing with 5kg/ha seed rate. The maximum diameter of root was recorded in treatments 1st august sowing with 5kg/ha seed rate and 15th July sowing with 5 kg/ha seed rate. In grade wise classification of roots maximum A grade roots are recorded in the treatment 1st august sowing with 5kg/ha seed rate in ashwagandha.

Key words: sowing time, seed rate, length of root, diameter of root, root grading.

Introduction

India, both indigenous and introduced, has been variously put at between 3000 to 3500 species of higher plants. Out of that ashwagandha is most important medicinal plant (sarin, 2003). It is coined the two words viz., aswini and gandha. Aswini means 'horse' and gandha means 'power' (Gupta, 1967).Aswagandha has recently acquired considerable significance on account of its large demand in foreign countries, especially in US market. There is good scope for medicinal and unani medicines. There is good demand for root and seed of ashwagandha which are used in medicines. The pharmacological activity of root is attributed to several alkaloids. The roots of this plant contain many alkaloids and withanoils, such as withanine, somniferine (dastur, 1970) the total alkaloids of the root has been reported to vary between 0.13 to 0.31(upto 4.3%) have been recorded elsewhere (anon., 1976).

Ashwagandha is important plant cultivated only in north- western region of Madhya Pradesh on about 4000 ha in India. Ashwagandha belongs to the genus *withania* and family Solanaceae. Only two species viz. *withania somnifera*, dunal and *withania coagulans* dunal are found in India. Ashwagandha is late season kharif crop. it is ready for harvest in 150-170 days after sowing. Improved varieties of ashwagandha are WS-20, WS—22, WS-27-7, WS-90-100, JS-29, poshita.

The present study carried out that, to study the effect of sowing time and seed rate on improve quality, root yield and alkaloid content of ashwagandha.

Materials and methods

A field experiment was laid out in plot no. 8 during kharif season of 2004-2005 at main garden, department of horticulture, Dr. PDKV, Akola (M.S.) on ashwagandha of variety WS-20. The experiment was laid out in split plot design with three replications. The treatments consist of six sowing time and four seed rate.

Sowing time (main treatments)	Seed rate rate (sub treatments)
D1- 1 st July	S1-2.5 kg /ha
D2- 15 th July	S2-5.0 kg /ha
D3- 1 st august	S3-7.5 kg /ha
D4- 15 th august	S4-10 kg /ha
D5- 1 st September	
D6- 15 th September	

There are 72 plots was laid out with 2.4 x 2.4m size and spacing will be matain of 30 cm (row to row). The experiment was laid out in split plot design with three replications and treatments are,

D₂S₂, D₂S₄, D₂S₁, D₂S₃, D₆S₅, D₆S₁, D₆S₄, D₆S₂, D₁S₄, D₁S₃, D₂S₂, D₁S₁, D₄S₂,
D₄S₄, D₄S₁, D₄S₃, D₃S₄, D₃S₁, D₃S₃, D₃S₂, D₅S₃, D₅S₁, D₅S₂, D₅S₁.

The 1st irrigation was given after every sowing and then crop was irrigated only during dry spell throughout the growing season of crop. In order to keep the crop free from weed, weeding was undertaken 20 days after sowing. And another weeding was carried out as per the requirement. The harvesting was done as per maturity of crop starting from last sowing date of seed. The entire plant was uprooted for root which was separated from the aerial parts by cutting the stem 1cm above the collar. These were transversely cut into smaller pieces to facilitate drying. After that rescored the observation of length of root (cm), diameter of root (cm), and gradewise classification of roots randomly.

Result and discussion

The maximum length of root was found in treatment combination of 15th July sowing with 5kg/ha seed rate [d₂s₂ (25.96 cm)] which was at par with 15th July sowing with 7.5 kg/ha seed rate, 1st august sowing with 5 kg/ha seed rate, 1st august sowing with 7.5 kg/ha seed rate and minimum in the treatment 15th September sowing with combination of 2.5 kg/ha seed rate [d₆s₁ (14.16 cm)].

The maximum diameter of root was found in treatment combination of 1st august sowing with 5 kg/ha seed rate and 15th July sowing with 5kg/ha seed rate [d3s2, d2s2 (1.44 cm)]. and minimum in the treatment 1st September sowing with combination of 2.5 kg/ha seed rate and 15th September sowing with combination of 2.5 kg/ha seed rate [d6s1 (14.16 cm)].

In grade wise classification of roots maximum 'A' grade roots are recorded in the treatment 1st august sowing with 5kg/ha seed rate [d3s2 (3.93q/ha)] and low grade roots are recorded in the treatment 1st July sowing with 2.5 kg/ha seed rate [d1s1 (0.794q/ha)] in ashwagandha.

Table Length of root as influenced by sowing time and seed rate (cm)

Sowing time	Seed rate (kg/ha)				Mean
	S ₁ (2.5kg)	S ₂ (5kg)	S ₃ (7.5kg)	S ₄ (10kg)	
D ₁ (1 st July)	19.17	22.45	22.43	19.50	20.88
D ₂ (15 th July)	20.58	25.96	25.88	20.21	23.15
D ₃ (1 st Aug)	20.20	22.88	25.89	20.21	23.02
D ₄ (15 th Aug)	19.45	22.79	22.45	19.17	20.96
D ₅ (1 st Sept)	17.24	19.50	19.17	17.51	18.48
D ₆ (15 th Sept)	14.16	15.58	15.17	14.48	14.84
Mean	18.55	22.02	21.81	18.51	
	Sowing time (D)		Seed rate (S)		Interaction (DxS)
'F' test	Sig.		Sig.		Sig.
SE (m)	0.435		0.305		0.747
CD at 5%	1.371		0.873		2.138

Table Root diameter as influenced by sowing time and seed rate (cm)

Sowing time	Seed rate (kg/ha)				Mean
	S ₁ (2.5kg)	S ₂ (5kg)	S ₃ (7.5kg)	S ₄ (10kg)	
D ₁ (1 st July)	1.00	1.32	1.28	1.11	1.17
D ₂ (15 th July)	1.33	1.44	1.42	1.39	1.39
D ₃ (1 st Aug)	1.32	1.44	1.42	1.33	1.37
D ₄ (15 th Aug)	1.11	1.33	1.32	1.00	1.19
D ₅ (1 st Sept)	0.87	0.97	0.96	0.91	0.93
D ₆ (15 th Sept)	0.87	0.95	0.91	0.91	0.91
Mean	1.08	1.24	1.21	1.10	
	Sowing time (D)		Seed rate (S)		Interaction (DxS)
'F' test	Sig.		Sig.		Sig.
SE (m)	0.020		0.016		0.040
CD at 5%	0.063		0.047		0.115

Table Gradewise classification of roots (q/ha)

Treatments	Total yield (q/ha)	A grade	B grade	C grade	Low grade
D ₁ S ₁	3.97	0.794	0.992	1.29	0.794
D ₁ S ₂	7.04	1.76	1.76	2.12	1.40
D ₁ S ₃	6.84	1.71	1.71	2.05	1.37
D ₁ S ₄	4.79	0.969	1.19	1.45	1.19
D ₂ S ₁	8.68	2.17	2.17	2.62	1.75
D ₂ S ₂	9.84	3.85	2.06	2.06	1.87
D ₂ S ₃	9.61	3.88	1.93	1.93	1.93
D ₂ S ₄	8.71	2.17	2.17	2.62	1.75
D ₃ S ₁	7.04	1.76	1.76	2.11	1.41
D ₃ S ₂	9.84	3.93	1.97	1.97	1.97
D ₃ S ₃	9.67	3.77	2.03	2.03	1.84
D ₃ S ₄	6.84	1.71	1.71	2.05	1.37
D ₄ S ₁	4.70	0.94	1.17	1.42	1.17
D ₄ S ₂	8.71	2.17	2.17	2.62	1.75
D ₄ S ₃	8.50	2.12	2.12	2.55	1.71
D ₄ S ₄	5.52	1.10	1.38	1.66	1.39
D ₅ S ₁	3.10	0.465	0.620	0.775	1.24
D ₅ S ₂	4.93	0.990	1.23	1.48	1.23
D ₅ S ₃	4.79	0.960	1.19	1.45	1.19
D ₅ S ₄	3.17	0.474	0.634	0.792	1.27
D ₆ S ₁	3.17	0.474	0.634	0.792	1.27
D ₆ S ₂	4.73	0.950	1.18	1.42	1.18
D ₆ S ₃	4.65	0.93	1.16	1.40	1.16
D ₆ S ₄	3.10	0.465	0.620	0.775	1.24

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