

Phenology and growth analysis study of ashwagandha [*Withania somnifera* (L.) Dunal.] for yield and alkaloid accumulation under winter sown conditions

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SUMMARY

The experiment was conducted in Herbal Garden, Department of Plant Physiology, Jawaharlal Nehru Agricultural University, Jabalpur during 2002-2003 winter season. The experiment was conducted in a completely randomized design with 10 treatments (various stages of growth and development were the treatments) replicated thrice. The results revealed that *Withania* seeds required 12 days to germinate during winter season. First primary, secondary and tertiary branching were initiated on 20th, 45th and 60th days after sowing (DAS), respectively. There was flower bud initiation after two months (60 DAS). First flowering was within one week after flower bud initiation (65 DAS). Crop took a fortnight to come in 50 per cent flowering (75 DAS). Three months after sowing (90 DAS) first fruit initiation began. Crop required a month (30 days) for 75 per cent fruit set (120 DAS). Fruit maturity period lasted for one and half month thereafter. Crop required ten days for physiological maturity (160 DAS) after 50 per cent fruit maturity and next ten days for physical maturity (170 DAS). The ashwagandha crop has vegetative phase of 65 days and reproductive phase of 70 days. There was significantly higher LAI at first fruit maturity (135 DAS) that was the period at which alkaloid per cent of leaves too was significantly higher. Thus, maximum LAI is the indicator of highest alkaloids in leaves. Relative crop growth (RGR) continued to decrease after 90 DAS. This period onwards alkaloid content was higher in plant part. Crop growth rate which have relevance for rate of dry matter production was indicating negative value at 75 per cent fruit set (120 DAS) and after it. Leaves are the source of alkaloid thus their number, ratio with unit ground (LAI) and biomass were functioning in relation to total alkaloid content in leaves and roots were higher at 135 DAS. Plant height reached to 30.10 cm at maturity which was double than height at 90 DAS (14.31 cm). Root length of crop was one third (10.29 cm) to that of plant height at maturity while alkaloid content was significantly higher at 135 DAS. Leaves/plant were significantly higher in 120 days old crop (60.44 per plant) and there after senescence begins. Similarly, numbers of branches per plant too were significantly higher (5.88/plant) in four months (120 DAS) old crop. The root yield/ha was 6 q/ha while the total biological yield was 11.86 q/ha. The best harvesting time for crop was at 135 to 150 DAS (first fruit to 50% fruit maturity).

Key Words : Ashwagandha, *Withania somnifera*, Alkaloid content

How to cite this article : Baraiya, B.R., Tiwari, G., Barde, S.K. and Chhapare, R. K. (2012). Phenology and growth analysis study of ashwagandha [*Withania somnifera* (L.) Dunal.] for yield and alkaloid accumulation under winter sown conditions. *Internat. J. Plant Sci.*, 7 (1) : 135-139.

Article chronicle : Received : 05.10.2011; Sent for revision : 26.10.2011; Accepted : 02.12.2011

The experiment was conducted in Herbal Garden, Department of Plant Physiology, Jawaharlal Nehru

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Agricultural University, Jabalpur during 2002-2003 winter season. Ashwagandha [*Withania somnifera* (L.) Dunal] is an important medicinal plants belonging to family Solanaceae, is known as Indian Ginseng in the international market due to aphrodisiac and rejuvenating properties of its roots. All organs of *Withania somnifera* are useful medicinally but roots are commercially the most important one. Roots have neuro- tonic, abortifacient, anti-inflammatory, alterative, aphrodisiac properties and used commonly in consumption, emaciation,