

Site specific nutrient management for *Withania somnifera* at subtropical belt of Uttaranchal

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ABSTRACT

To study the effect of various nutritional package (balanced fertilizer application), the effect of 16 treatment combinations of various nutrients on yield & quality was studied in randomized block design during 2004-2005. The maximum root yield (14q/ha) was found in T₂ treatment (N₁₀₀+P₅₀+K₁₀₀+Mg₂₀S₂₅B₅Zn₂₀) which was at par to T₁, T₆ & T₉ treatments. Minimum root yield (6.5 q ha⁻¹) was found under Control treatment (T₁₆) which was at par with T₁₅, T₁₄, T₁₃ & T₁₂. Therefore it is suggested that to get higher root yield higher doses of nutrients should be applied, however the total alkaloid content under various treatments is yet to be measured to assess the quality of roots.

Key words : Ashwagandha, Nitrogen, Phosphorus, Potash, Maganesium.

INTRODUCTION

Ashwagandha (*Withania somnifera*) known as Indian Zing Seng, belongs to the family Solanaceae is an important cultivated medicinal crop of India and has been mentioned as an important drug in ancient ayurvedic literature. The root is the usable part (raw drug) having number of alkaloids, out of which withanine and somniferine are important. Total alkaloid content varies between 0.13% to 0.31%. This raw drug has been receiving a good deal of attention because of its antibiotic and antitumour properties. The roots are basically used for curing general and sexual debility.

MATERIALS AND METHODS

Present study was conducted in sub tropical areas of Uttaranchal (Tarai) situated, between longitude & latitude of 79°30'E to and 29° N at an elevation of 243.83m above msl. The experiment was conducted at Medicinal Research & Development centre, of GBPUA&T Pantnagar, during late kharif season of 2003-2004 laid out in randomized block design with 3 replications having net plot size of 1x1 m². The treatment included 16 combinations of various nutrients viz., N₁₀₀+P₁₀₀+K₁₀₀Mg₂₀S₂₅B₅Zn₂₀ (T₁); N₁₀₀+P₅₀+K₁₀₀Mg₂₀S₂₅B₅Zn₂₀ (T₂); N₁₀₀+P₀+K₁₀₀Mg₂₀S₂₅B₅Zn₂₀ (T₃); N₁₀₀+P₁₀₀+K₅₀Mg₂₀S₂₅B₅Zn₂₀(T₄);N₁₀₀+P₁₀₀+K₀Mg₂₀S₂₅B₅Zn₂₀(T₅);N₁₀₀+P₁₀₀+K₁₀₀Mg₂₀S₂₅B₅Zn₂₀ (T₆); N₁₀₀+P₁₀₀+K₁₀₀Mg₂₀S₂₅B₀Zn₂₀ (T₇); N₁₀₀+P₁₀₀+K₁₀₀Mg₂₀S₀B₅Zn₂₀ (T₈); N₁₀₀+P₁₀₀+K₁₀₀Mg₀S₂₅B₅Zn₂₀ (T₉); N₁₀₀+P₁₀₀+K₁₀₀ (T₁₀); N₂₅+P₄₀+K₃₀ (RDF) (T₁₁); V.C @5t/ha (T₁₂); FYM@ 5t/ha (T₁₃); N₂₅+P₄₀+K₃₀ (RDF)+V.C @ 5t/ha(T₁₄); N₂₅+P₄₀+K₃₀+FYM @ 5t/ha (T₁₅); Control (No Nutrient) (T₁₆). The half dose of N & full dose of P, K, Mg, S, B, & Zn were applied as basal before sowing as per treatment. Rest of the half dose of nitrogen was applied at 45 DAS. The sources of N, P, K, Mg, B, S & Zn were Urea, DAP, Muriate of Potash, Magnesium Chloride (MgCl₂), Boric acid (H₃BO₃), Sulphur powder and Zinc Chloride (ZnCl₂) respectively. The variety Jawahar -20 was sown in the last week of September in lines at R-R 30cm & P-P 10cm distance. The seed was soaked in water for 24 hours & treated with fungicide thiram @ 3 g / kg of seed to protect from fungal diseases. All intercultural operations were preformed for growing a good crop. Data on plant height, number of branches, number of leaves, root length, root diameter, were recorded in 10 randomly selected tagged plants. Where

as data on herbage weight, (fresh & dry), root weight (fresh & dry), number of berries were recorded from 1 meter row length. Seed weight / berry was computed by randomly selecting 50 berries from each plot after threshing them & 1000 seed weight (g) was estimated by weighing 1000 seeds taken randomly from selected berries for each plot separately. Root yield & herbage yield was recorded from net plot harvested.

RESULTS AND DISCUSSION

Effect of different treatments on plant height was found to be significant. Maximum plant height was recorded in T₅ (37.3 cm) which was at par with T₁, T₂, T₃, T₆, T₈ & T₉. Minimum plant height was recorded under Control (22.73cm). Effect of different treatments on number of branches per plant, number of leaves per plant, herbage weight (Fresh & Dry) and herbage yield was found significant. Maximum number of leaves per plant (191.9), number of branches per plant (17.7), herbage fresh (1181.4) as well as dry weight (357.8) gram per metre row length and herbage yield (12466.6 Kg ha⁻¹) was found in T₂ (N₁₀₀ P₅₀ K₁₀₀ Mg₂₀ S₂₅ B₅ Zn₂₀) treatment. All the said parameters performed significantly superior from the treatments, which do not have combination of micronutrients.

Effect of different treatments on fresh & dry weight of root (per meter row length), length & root diameter per plant and root yield per net plot (Kg ha⁻¹) was found significant. Maximum fresh (105.9 g/m row length) & dry weight (28.83 g/m row length) of root, root length (26.68cm), root diameter (1.46mm) & maximum root yield (1400 Kg ha⁻¹) was found under T₂ treatment (N₁₀₀+P₅₀+K₁₀₀Mg₂₀S₂₅B₅Zn₂₀). It is important to mention here that root is the most important usable part of the plant for all medicinal purposes.

Thousands seed weight & Number of berries were also affected significantly by different treatment. Maximum 1000 seed wt was found under T₈ (N₁₀₀+P₁₀₀+K₁₀₀+Mg₂₀S₀B₅Zn₂₀) which was at par with T₂, T₆ & T₁₄ and superior from rest of the treatments. Number of berries were found again maximum under T₂ treatment which was at par with T₁, T₃, T₆, T₇, T₈, & T₉ however, superior to rest of the treatments.

The results are contrary to the results reported by Farooqi (2001) that Ashwagandha is a crop of residual fertility & does not give

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