

Effect Of Rhizobacterial inoculation on yield and quality of ashwagandha cv. JAWAHAR 20

H. GOPAL*, P. RAJA AND T. NATARAJAN

Department of Agricultural Microbiology, Tamil Nadu Agricultural University Microbiology, Coimbatore-641003 (T. N.) India

E-mail: gopalmicro2003@yahoo.co.in.

(Accepted : March, 2006)

SUMMARY

The rhizobacterial inoculation positively influenced the germination, vigour index, shoot and root length, biomass, dry matter production, root and alkaloid yield of ashwagandha. Inoculation of *Azospirillum lipoferum*-AAs-11, *Azotobacter*-AAz-3, *Bacillus*-APb-1 and *Pseudomonas fluorescens*-APs-1 as combined inoculant recorded the maximum growth, fruit, seed and alkaloid yield of ashwagandha.

Key words : Rhizobacterial inoculation, Yield, Quality, Ashwagandha.

In India, the use of medicinal plants to cure specific ailments has been in vogue from ancient times. More than two thousand medicinal plant species have been reported in India and it occupies the top position in the export of medicinal plants. In spite of the ever growing demand for medicinal plants in pharmaceutical and phytochemical industries they are still collected from their natural habitats. The natural resources how-so-ever large are bound to diminish and time has therefore come to bring these plants under plough to meet the rising demand of the resultant product. Mediculture, the scientific cropping of important medicinal plants has become the need of the day to improve the productivity and quality of these medicinal plants.

Ashwagandha (*Withania somnifera* Dunal.), a traditional medicinal plant is cultivated in different parts of Tamil Nadu. Because of its medicinal value and alkaloid content there is a great demand for the crop leading to an intensification of its cultivation. The knowledge on the use of various agrotechniques to increase the yield and quality of ashwagandha is inadequate. The rhizobiocoenosis is an important biological process that plays a major role in satisfying the nutritional requirement of these crops. The free-living plant growth-promoting rhizobacteria (PGPR) can be used in a variety of ways to increase the plant growth. The addition of PGPR increased the germination rate, root growth, leaf area, chlorophyll content, magnesium content, nitrogen content, protein content, hydraulic activity, tolerance to drought, shoot and root weights, and delayed leaf senescence which reflected in higher grain yield (Lucy *et al.*, 2004). In this context, efforts were made to exploit the potential of bioinoculants to sustain the cultivation of ashwagandha in a scientific way.

MATERIALS AND METHODS

A pot culture experiment was conducted at the Department of Agricultural Microbiology, TNAU, Coimbatore to study the effect of combined inoculation

of rhizobacteria on growth, yield and quality of ashwagandha (var. Jawahar 20). The rhizobacterial isolates viz., *Azospirillum lipoferum*-AAs-11, *Azotobacter*-AAz-3, *Bacillus*-APb-1 and *Pseudomonas fluorescens*-APs-1 were prepared as carrier based inoculants used for this study. The pots were filled with potting mixture (soil + sand + FYM) and the rhizobacteria treated seeds were sown at 25 seeds per pot and finally 5 seedlings were maintained. The experiment was conducted in completely randomized block design with three replications.

The total number of fruits produced by the plant was counted and fruit yield was expressed in number plant⁻¹. The fully ripe berries were harvested and dried in the shade. The seeds were extracted from the dried berries by gently rubbing against cement floor. The extracted seeds were cleaned by winnowing, and expressed as number of seeds per fruit. The total alkaloid content of roots was estimated by adopting the method suggested by Srivastava and Iyer (1960). One gram of powdered root material was extracted with a mixture of ether: ethanol (4:1) for 24 h. The extract was shaken with 25 ml of 5.0 per cent H₂SO₄ thrice (3 x 25 ml). Diluted ammonia solution (1:10) was added to the pooled extract until it became alkaline. It was then extracted with 20 ml of chloroform thrice until extraction of alkaloids was complete. The chloroform extract was washed with 5.0 ml of distilled water and filtered through pre weighed filter paper. Two ml of absolute alcohol was added to the residue and evaporated. The dry weight of the filter paper with residue was estimated and the total alkaloid was estimated by subtracting the filter paper weight and expressed as percentage on dry weight of sample.

RESULTS AND DISCUSSION

In various treatments the number of fruits per plant and number of seeds per fruit in ashwagandha varied from 64.54 to 95.36 and 17.00 to 22.25 respectively. Among the individual inoculations, *Azospirillum lipoferum*-AAs-11 recorded maximum number of fruits and seeds (81.66 and 18.92 respectively), whereas the uninoculated control recorded only 64.54 and 17.00 number of fruits and seeds

*Author for correspondence