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Growth and composition of *Rauvolfia Serpentina* influenced by Blue Green Algae as Biofertilizer

Hemant Kumar & Jitendra Mohan
Paryavaran Sodh Ekai, Botany Dept., D.A-V. College, Kanpur
hemantelite83@gmail.com

ABSTRACT

Sarpagandha (*Rauvolfia serpentina*, L.) plants cultured as soil-pot culture conditions with different doses nil (control), 25, 50, 75, 100 and 125g BGA (*Aulosira fertilissma*)/Kg soil. As compared to control, each level of BGA (cyanobacteria) supply showed highly significant (P = 0.01) increase in dry matter yield and catalase activity of both 30 and 60 days old tops and roots of Sarpagandha plants. However, increase in peroxidase activity at each level of BGA supply, as compared to control, was found to be highly significant (P=0.01) in tops of 30 and 60 days old Sarpagandha plants. 125g BGA/kg soil level over control showed significant (P=0.05) increase in peroxidase activity in tops of 30 days old Sarpagandha plants. Over all BGA as biofertilizer was found to be the best for qualitative and quantitative improvement of Sarpagandha plants.

INTRODUCTION

Cultivation of plants is oldest occupation of human history. Ancient Indians were known as Fathers of cultivation. Man started cultivation of plants on land in an organized way after he found that due to repeated cultivation of the same plant on the same piece of land, the growth of the plant is adversely affected to a great extent; and this lead to the thoughts of finding the ways and means of improving the fertility of the soil. Nitrogen fertilizers continued to serve for increasing yield production until a foreseeable feature but the effects should also be oriented towards augmenting biological nitrogen fixation meted by micro-organisms. Current trend is to explore the possibilities of replacing chemical fertilizers with organic ones, more particularly biofertilizers of microbial origin. Sarpagandha is one of the well known plant drugs in the world. The roots and their major alkaloidal constituents, notably reserpine, rescinnamine and diserpidine, have been extensively researched in India. The roots have been used for centuries in Ayurvedic and Unani medicine as a hypnotic and sedative, for reducing high blood pressure, and for treating various central nervous system disorders, both psychic and motor, including anxiety, psychosis, schizophrenia, epilepsy and insomnia. Among the tribal inhabitants of Southern and Eastern Bihar (Jharkhand), the powdered roots are given orally as an antidote to snake venom. Extracts of the roots are valued for treatment of intestinal disorders, particularly diarrhoea and dysentery, and also as an anthelmintic. Mixed with other plant extracts, they have been used for treating cholera, colic and fever. A decoction of the root is believed to stimulate uterine contraction and is recommended for use in difficult cases of childbirth. The present investigation is aimed to utilize BGA (cyanobacteria) as a biofertilizer for improvement of Sarpagandha plants. (Agnihotri, 2011).

MATERIAL AND METHODS

Sarpagandha (*Rauvolfia serpentina,* L.) plants were cultivated in soil-pot culture conditions. The details of soil preparation with blue green algae (Aulosira fertilissma) as biofertilizer and culture of plants were same as described earlier by Agnihotri (2011). Soil amendments with BGA as biofertilizer were nil (control), 25, 50, 75, 100 and 125g BGA/kg soil. Tops at 30 and 60 days growth and roots of 60 days old Sarpagandha plants were taken for estimations of dry matter yield, and catalase and peroxidase activities. The procedure was same as described earlier by

Agnihotri (2011).

RESULTS

Dry Matter Yield (Table-1)

With the increase in BGA supply level up to 125g BGA/kg soil, the dry matter yield of tops of both 30 and 60 days old plants and roots of Sarpagandha plants increased.

Over control, each level of BGA supply showed highly significant (P=0.01) increase in the dry matter yield of both 30 and 60 days old tops and roots of Sarpagandha plants.

Except at 75g BGA/kg soil supply level over 50g BGA/kg soil supply level in roots, the difference was found to be significant (P=0.05), and in tops of 50 days old plants, 100g BGA/kg soil over 75g BGA/kg soil and 125g BGA/kg soil over 100g BGA/kg soil level failed to show any significant difference. The increase in dry matter yield was fond to be highly significant (P=0.01) at 50g BGA/kg soil over 25g BGA/kg soil level in tops of both 25 and 50 days old plants and at 100g BGA/kg soil over 75g BGA/kg soil and 125g BGA/kg soil over 100g BGA/kg soil level in tops of 50 days old plants and in roots.

Maximum dry matter yield of tops of both 30 and 60 days old plants and in roots of Sarpagandha plants at 125g BGA/kg soil supply level.

Catalase Activity

The increase in catalase activity was observed with the increase in BGA supply level up to 75g BGA/kg soil level. Beyond 75g BGA/kg soil level, the decrease in catalase activity was observed with the increase in BGA supply level.

The increase in catalase activity was found to be significant (P = 0.01) at each level of BGA supply, over control, in tops of 30 and 60 days old Sarpagandha plants both.

The increase in catalase activity of tops of both 30 and 60 days old plants at 75g BGA/kg soil over 50g BGA/kg soil and at 50g BGA/kg soil over 25g BGA/kg soil level, was found to be highly significant (P=0.01), 125g BGA/kg soil over 100g BGA/kg soil level showed significant (P=0.05) decrease in catalase activity of tops of 60 days old plants, and 125g BGA/kg soil over 100g BGA/kg soil levels in tops of 30 days old plants and 100g BGA/kg soil over 75g BGA/kg soil level in tops of 30 and 60 days old plants showed highly significant (P=0.01) decrease in catalase activity of Sarpagandha plants. Maximum value for catalase activity in tops of both 30 and 60 days old plants was found at 75g BGA/kg soil level.

Peroxidase Activity (Table-1)

The peroxidase activity increased with the increase in BGA supply level up to 75g BGA/kg soil level in tops of 30 days old plants, and 125g BGA/kg soil level in 60 days old Sarpagandha plants. Beyond 75g BGA/kg soil level in tops of 30 days old plants decrease in peroxidase activity was observed with increase with in BGA supply level up to 125g BGA/kg soil level.

As compared to control, at each level of BGA supply the increase in peroxidase activity was found to be highly significant (P=0.01) in tops of both 30 and 60 days old plants. However, 125g BGA/kg soil level over control showed significant (P=0.05) increase in peroxidase activity in tops of 30 days old plants.

Highly significant (P=0.01) increase in peroxidase activity at 50g BGA/kg soil over 25g BGA/kg soil, 75g BGA/kg soil over 50g BGA/kg soil in tops of both 30 and 60 days, at 100g BGA/kg soil over 75g BGA/kg soil and 125g BGA/kg soil over 100g BGA/kg soil level in tops of 60 days old plants was observed. The decrease in peroxidase activity in tops of 30 days old plants, at 200g BGA/kg soil over 75g BGA/kg soil and 125g BGA/kg soil over 100g BGA/kg soil supply level was found to be highly significant (P=0.01).

Maximum peroxidase activity at 75g BGA/kg soil level in tops of 30 days and 125g BGA/kg soil supply level in tops of 60 days old plants was observed.

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Table No.-1
Growth and composition of Rauvolfia serpentina influenced by blue green algae (Cyanobacteria) as biofertilizer

Plant		g blue green algae / kg soil						L.S.D. at	
Age (days)	Part	Nil	25	50	75	100	125	P=0.05	P=0.01
g dry matter yield									
30	Tops	0.27	0.31	0.34	0.35	0.37	0.43	0.119	0.011
60	Tops	10.94	17.40	19.20	25.02	25.46	26.04	0.984	1.348
60	Roots	1.25	1.52	1.72	1.82	1.92	2.05	0.179	0.108
unit catalase / g.f.m.									
30	Tops	6.36	6.93	7.81	8.12	8.08	7.93	0.02	0.04
60	Tops	5.37	5.72	6.01	6.22	6.12	6.05	0.07	0.09
?OD peroxidase									
30	Tops	0.045	0.051	0.060	0.067	0.063	0.048	0.003	0.004
60	Tops	0.047	0.053	0.056	0.060	0.064	0.066	0.001	0.002