Current Research in Biological Sciences (2025);1(1): 15-19 **ISSN: XXXX-XXXX**

RESEARCH ARTICLE

The Influence of *Lablab purpureus* Growth by application of Bacterial Biofertilizers

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Abstract: *The global agricultural sector is continually seeking sustainable and eco-friendly methods to enhance crop productivity.* Lablab purpureus*, commonly known as the hyacinth bean, is a vital legume crop valued for its nutritional content and adaptability to diverse climatic conditions. This study explores the impact of bacterial biofertilizers on the growth and yield of* Lablab purpureus. *The primary objective of this research is to evaluate the effectiveness of bacterial biofertilizers in promoting the growth of Lablab purpureus compared to traditional chemical fertilizers. The study aims to assess the growth parameters, including plant height, biomass production, and pod yield, as influenced by biofertilizer application. The findings suggest that bacterial biofertilizers can serve as a viable alternative to chemical fertilizers, offering environmental benefits and enhancing crop growth. The symbiotic relationship between* **Lablab purpureus** *and the nitrogen-fixing bacteria in the biofertilizers likely contributed to improved nutrient uptake and growth efficiency.*

Keywords: Lablab purpureus, *Bacteria, Biofertilizer Yield.*

1. INTRODUCTION

The population of our country is increasing in geometric progression while food production is increasing in arithmetic progression. To meet the needs of people, several methods are being adapted to increase the food production; one such thing is supplementing the deficient nutrients to a plant and to increase its yield by addition of chemicals and biofertilizers. Biofertilizers are becoming more and more popular, since it is cheap and renewable one, and will not cause any pollution. One of the major concerns in today's world is pollution and contamination free environment. The use of chemical fertilizers and pesticides has caused tremendous effect to the environment. Biofertilizers will help to solve such problems as increased salinity of soil and chemical run off from the agricultural field.

Nitrogenous fertilizers produced in industry by Haber-Bosch process consume high energy (about 13,500 K Cal/Kg N fixed). In such industries, fossil fuel is the source of energy. In recent years, due to Gulf Crisis, the cost of crude oil increased about three fold within years. Therefore, fossil fuel based method of farming more expensive accordingly. To combat with this problem, however, it is necessary to develop an alternative method of supply nutrients to crop plants.

In recent years, use of microbial inoculants as a source of biofierlizer has become a hope for most of the countries, as far as economical and environmental viewpoints are concerned. Therefore, in developing countries like India, it can solve the problem of high cost of fertilizers and help in saving the economy of the country.

Biofertilizers are nknown to contribute in agriculture. They are,

- They liberate growth promoting substance and vitamins and help to maintain soil fertility.
- They suppress the incidence of pathogens and control diseases.
- They are cheaper, pollution free and based on renewable energy sources.
- They improve soil physical properties, tilth and soil health in general.
- Azotobacter and Azospirillum, besides supplying Nitrogen to soil, secrete antibiotics which act as pesticides**.**

2. AIM AND OBJECTIVES

Effect of Bacterial biofertilizers (*Rhizobium* sp., Phosphobacteria and *Azospirillum* sp.) on different growth parameters of *Lablab purpureus* L. plants like length of plant number of leaves, breadth of leaves, length of leaves, shoot length, number of flowers, root length and total length of plants.

3. MATERIALS AND METHODS

3.1. Study materials

The present investigation was undertaken to study the effect of bacterial biofertilizers on pulse crop like *Lablab purpureus* L. Biofertilizers such as *Rhizobium* sp., Phosphobacteria and *Azospirillum* sp. were isolated from soil samples and used as inoculums.

3.2. Soil selection and sterilization

Red soil was collected and it was mixed with sand in the ratio of 2:1)v/v). The sand soil mixture was sterilized at 121ºC (151bs) for one acre for two consecutive days.

3.3. Identification of bacteria

Identification of bacterial members was done by Gram staining, Motility test and bio-chemical tests. The isolated strains were confirmed with Bergey's Manual Of Systemic Bacterialology (Jordan, 1984).

3.4. Subculturing of bacterial strains

All the isolated bacterial cultures were isolated as pure culture by subculturing them in a respective agar media. Culture of all bacteria was inoculated into specific selective agar as slants. The test tubes were incubated in a refrigerator conditions for further processing.

4. RESULTS AND DISCUSSION

The present investigation was carried out to study the effect of bacterial biofertilizers on pulse crops like *Lablab purpureus* L.

- Isolation of bacteria
- Isolation of Rhizobium sp. from the root nodules
- Isolation of Azospirilum sp.
- Isolation of phosphobacteria

4.1. Effect on bio-chemical parameters

Effect on chlorophyll content

Then cholophyll content of *Lablab purpureus L.* gram plants inoculated with *Rhizobium* sp., Phosphobacteria and *Azospirillum* sp. were recorded maximum followed by dual, alone and control plants.

In *Lablab purpureus L.* the chrolophyll content was increased in combined inoculation of *Rhizobium* sp., Phosphobacteria and *Azospirillum* sp. treatments were 5.89mg/g than in control plants(Table. 3).

Effect on protein content

The protein content of *Lablab purpureus L.* inoculated with combined treatments of *Rhizobium* sp., Phosphobacteria and *Azospirillum* sp. were recorded maximum followed by dual, alone and control plants.

The protein content of *Lablab purpureus L.* plants were 4.36 mg/g, 1.17(*Rhizobium* sp and Phosphobacteria), and 0.25 in control plants (Table. 3).

Effect on carbohydrate

The combined inoculation of *Rhizobium* sp., Phosphobacteria and *Azospirillum* sp. treated plants of *Lablab purpureus L.* were recorded maximum followed by dual, alone and control plants .

The cabohydrate contents of *Lablab purpureus L.* were 23.80 mg/g, 21.57 (*Rhizobium* sp and *Azospirillum* sp.),14.80(*Rhizobium* sp.) and 11.0 respectively on 40 DAS (Table. 3).

The total free acids of *Lablab purpureus L.* plants treated with *Rhizobium* sp., Phosphobacteria and *Azospirillum* sp. were showed maximum than dual, alone and control plants.

The total free amino acids contents of *Lablab purpureus L.* plants were 18.46 mg/g. 15.75 (*Rhizobium* sp and Phosphobacteria), 7.10 (*Rhizobium* sp.) and 2.25 respectively on 40 DAS (Table. 4).

Effect on reducing sugar

The reducing sugar content on *Lablab purpureus L.* with combined treatments of *Rhizobium* sp., Phosphobacteria and *Azospirillum* sp. was found to be 5.43 mg/100g, 4.95 in dual (Phosphobacteria and *Azospirillum* sp.), 3.40 in alone (*Azospirillum* sp.) and 18.0 in control plants (Table. 4).

Effect on inorganic phosphorus content

The increase in inorganic content was observed in *Lablab purpureus L.* plants of combined treatments were 6.17 mg/g, 5.90 (*Rhizobium* sp and Phosphobacteria)on 40 DAS (Table. 4).

5. SUMMARY

The present investigation was carried out to study the effect of bacterial Biofertilizers on pulse crop like *Lablab purpureus* L. plants. Bacterial biofertilizers like *Rhizobium* sp., Phosphobacteria and *Azospirillm* sp. were isolated from the soils of agricultural crops by employing plating techniques. The isolation was done by selective medium such as *Rhizobium* medium and Yeast Extract Mannitol Agar for *Rhizobium* sp., Pikovskaya's agar for Phosphate solubilizing microbes and Semisolid agar for *Azospirillum* sp.

Table 1: Effect of morphological parameters of *Lablab purpureus* L. inoculated with bacterial biofertilizers.

Treatments	**Number of leaves/plant**	**Length of leaves (cm)**	**Breadth of leaves (cm)**	**Length of plant (cm)**	**Shoot length (cm)**
Control	15.8	3.6	4.6	68.1	55.0
Rhizobium sp.	17.6	5.4	6.3	75.6	60.1
Azospirillum	15.9	5.8	4.9	70.4	63.4
Phosphobacteria sp.	16.8	6.4	6.1	76.1	59.4
Rhizobium sp. +*Azospirillum*	17.8	5.9	5.8	79.1	69.1
Rhizobium sp. + Phosphobacteria sp.	19.4	7.6	5.4	78.0	72.1

Table 2: Effect on yield concepts of *Lablab purpureus* L. inoculated with bacterial biofertilizers.

Treatments	**Number of nodules/plant**	**Number of flowers/ plant**	**Root length (cm)**	**Total length of plant (cm)**
Control	8.4	6	16.8	90.9
Rhizobium sp.	12.2	8	18.3	96.8
Azospirillum	12.0	7	19.2	99.4
Phosphobacteria sp.	9.0	6	19.3	101.1
Rhizobium sp. +*Azospirillum*	12.0	8	17.9	106.4
Rhizobium sp.+ Phosphobacteria sp.	18.2	7	27.9	115.1
Azospirillum sp .+Phophobacteria	21.0	6	27.0	115.3

Table 3: Effect of biochemical parameters of *Lablab purpureus* L. inoculated with bacterial biofertilizers

Treatments	**Chlorophyll (mg/g)**	**Protein (mg/g)**	**Carbohydrate (mg/g)**
Control	0.70	0.25	11.0
Rhizobium sp.	1.06	0.30	14.01

Azospirillum	1.37	0.27	14.80
Phosphobacteria sp.	1.57	0.33	14.80
Rhizobium sp. + *Azospirillum*	1.62	0.62	15.11
Rhizobium sp. + Phosphobacteria sp.	1.91	0.54	15.27
Azospirillum sp .+Phophobacteria	1.99	0.56	15.51

Table 4: Effect of biochemical parameters of *Lablab purpureus* L. plants inoculated with bacterial biofertilizers.

Treatments	**Reducing sugar (mg/g)**	**Amino acids (mg/g)**	**Inorganic phosphorus (mg/g)**
Control	1.80	2.25	2.08
Rhizobium sp.	1.90	5.10	2.26
Azospirillum	3.40	5.60	2.13
Phosphobacteria sp.	1.90	7.60	2.26
Rhizobium sp. +*Azospirillum*	3.80	9.69	2.58
Rhizobium sp. + Phosphobacteria sp.	3.30	9.18	2.45
Azospirillum sp .+Phophobacteria	3.70	11.73	2.64
Rhizobium +Phophobacteria +*Azospirillum*	4.95	15.75	5.90
Neem Cake +Rhizobium +Phophobacteria +*Azospirillum*	4.28	13.08	4.20

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