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Effect of EM on Groundnut (*Arachis hypogaea* L.) Growth

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Abstract: Effect of Effective Microorganisms is seen on groundnut growth. EM is applied on two varieties (V₁ = 1 C G -2261 and V₂ = 1CGV-86550) in three treatments. These three treatments are T₁ = control, T₂ = seed inoculation and T₃ = seed inoculation with EM EM spray, Treatment T₃ showed more growth than T₂ and T₁ because in T₃, EM is applied in the form of seed inoculation as well as EM spray on ground. So, growth can be increased by the application of more EM concentration,

Key words: Effective microorganisms groundnut growth, seed inoculation EM concentration

Introduction

Groundnut (*Arachis hypogaea* L.) is an annual legume crop with well-developed root system. Being an oil seed crop, it is used for edible purpose. It mostly grows on low fertility soils and having low water holding capacity (W.H.C) In Pakistan, more than 85% area under groundnut cultivation lies in Punjab, 10% in NWFP and 5% in Sindh (Khan and Qayyum, 1986). Potohar region occupies 90 percent of total groundnut area in Punjab (Ali and Malik, 1993). The total area under groundnut cultivation has increased to 107.5 thousand hectares (Government of Pakistan, 1997).

In general, soils of Pakistan are nitrogen deficient. Nitrogen estimated from the organic fractions of Barani soils range from 0.03-0.07 percent (Smith *et al.*, 1991) Mostly this deficiency is fulfilled by the use of nitrogen fertilizers but this causes disturbances in water quality in lakes and streams in addition to losses it under goes in the soil (Allen and Allen, 1981). Groundnut being a legume has the advantage of improving soil fertility by fixing nitrogen biologically (Nourse, 1973).

More over, Biological Nitrogen Fixation (B.N.F) can be increased by Effective microorganism (EM) that ultimately enhance the growth and yield of leguminous plants and non leguminous plants upto 50 percent EM culture contains more than 90 percent organisms as lactobacilli that produce lactic acid. EM enhance the fermentation of organic material and make them more soluble under aerobic conditions. So the soils treated with EM become disease suppressive. There are two main objects of present work:

- 1) To see effect of EM on growth and yield of legume crop (Groundnut)
- 2) To see comparison between EM inoculation and EM inoculation + EM spray after seed emergence

Materials and Methods

In order to see the effect of EM on groundnut growth, a field experiment was conducted during Kharif 1998 in the field at the research area of University of Arid Agriculture, Rawalpindi (UAAAR). The study comprised of two varieties.

V₁ = ICG-2261
V₂ = ICGV-86550

And three treatments

T₁ = Control
T₂ = Seed inoculation with EM
T₃ = Seed inoculation with EM + EM spray

The treatment plot size was 3 × 4 m. A basal dose of NPK was applied at the rate of 20: 80: 40 kg/ha respectively. All

treatments were replicated three times in two factorial randomized complete block design (RCBD). Application of EM was carried out in two ways.

- 1) EM was inoculated to seeds (T₂)
- 2) After emergence, EM was applied in the form spray on groundnut (T₃)

Three plant samples were taken as sampling unit before harvesting. The plant samples were washed and then separated into root and shoot by cutting. The plant samples were weighed and then dried at 70°C in oven. Data was analyzed by ANOVA technique.

Results and Discussion

Root length and plant height in groundnut per plant range from 13.4 cm and 83.0 cm to 13.1 cm and 79.8 cm respectively, (The maximum root length and plant height is due to T₃ (Table 1, 2). Mane *et al.* (1993) found that Rhizobium inoculation with groundnut increased root length. Number of branches and weight of branches per plant determine the growth of a plant. Maximum number of branches (29.13) and weight (198.1 gm) were observed in T₃, while minimum number of branches (21.3) and weight (144.4 gm) were observed in T₁ (Table 3, 4).

Balamurugan and Gunasekaran (1996) also found that maximum plant growth was obtained in treatments which received the combined inoculation of Rhizobium and Phosphobacteria. Similarly, number of pods were more (23.3) in T₃ and less (13.5) in T₁ (Table 5). In addition, weight of pods was maximum (22.1 gm) in T₃ and minimum (14.0 gm) in T₁ (Table 6). Deshmukh and Dev (1995) confirmed that pod yield was higher in seeds inoculated with Rhizobium.

Table 1: Effect of EM on root length per plant (cm) Average of three replications

Treatments	V1 (cm)	V2 (cm)	Average (cm)
T ₁	13.1a	13.1a	13.1A
T ₂	13.5a	12.9b	13.2A
T ₃	13.9a	12.9b	13.4A
Average (cm)	13.5	N S	12.9

N.S = Non-significant at 5% probability level

Table 2: Effect of EM on plant height (cm) Average of three replications

Treatments	V1 (cm)	V2 (cm)	Average (cm)
T ₁	84.9b	74.7c	79.8B
T ₂	93.6a	72.5c	83.0A
T ₃	97.8a	71.6c	84.7A
Average (cm)	92.1	72.9	N S

Table 3: Effect of EM on number of branches per plant (cm) Average of three replications

Treatments	V1 (cm)	V2 (cm)	Average (cm)
T ₁	24.6 b	18.0 c	21.3 B
T ₂	26.0 b	22.6 be	24.3 B
T ₃	26.6 b	33.0 a	29.8 A
Average (cm)	25.7	N.S	24.7

Non. Significant at 5% probability level

Table 4: Effect of EM on fresh weight of branches per plant (gm) Average of replications

Treatments	V1 (cm)	V2 (cm)	Average (cm)
T ₁	148.6 c	140.4c	144.49
T ₂	157.4 be	155.6c	156.5 S.
T ₃	225.4 a	170.8b	196.1 A
Average (cm)	177.1	155.5	

Significant at 5% probability level

Table 5: Effect of EM on number pods per plant, Average of three replications

Treatments	V1 (cm)	V2 (cm)	Average (cm)
T ₁	15.0 c	12.0 c	13.5 EI
T ₂	17.3 be	16.6 bc	16.9 B
T ₃	26.3 a	20.3 b	23.3 A
Average (cm)	19.5 N.S	16.3	

Table 6: Effect of EM on weight of Pods per plant (gm) Average of three replications

Treatments	V1 (cm)	V2 (cm)	Average (cm)
T ₁	16.0 be	12.0 c	14.0 B
T ₂	18.9 b	14.3 c	16.6 B
T ₃	25.3 a	19.0 b	22.1 A
Average (cm)	20.0 N.S	15.0	

Non-significant at 5% probability level

It is found that maximum values were found in Treatment T3 and minimum values were in T1. This maxima and minima are due to EM application in different concentrations.

In Treatment 13, EM is applied in the form seed inoculation as well as CM spray on the grounds. While in Treatment T2, EM was applied in the form of seed inoculation. So, finally it might be included that growth can be increased by the application of more EM concentration

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