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Rhizobium bio-fertilizer technology increases yield of Groundnut and subsequent crop

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ABSTRACT

Agriculture is the only basis for feeding humanity. Adoption of modern agricultural practices and use of technology is inadequate in India. Arachis hypogea L. (Groundnut) belongs to family Fabaceae. It is an annual. The roasted seeds are edible. Oil is extracted from the seeds and used as fine cooking medium. Vegetable ghee (peanut butter) is also prepared from this oil. The oil cake is fed to the livestock. It is rich in fatty acids and proteins. The major constraints of Groundnut production in India are unreliable rain fall pattern, pest and diseases, socio-economic status of farmers, failure of communication media to reach in the area, lack of awareness and traditional mind psychology of farmers about improved agro-practices (Baldeo Sigh 1990). The chemical fertilizers cause impact on soil micro flora and fauna. In such situation it is need of the day to develop new easy low cost eco-friendly Rhizobium bio-fertilizer technology for Groundnut and residual effect of Rhizobium culture on yield of wheat, rice or subsequent crop etc. is always higher (Raverkar, K. P. and Konde, B. K. 1988). Present research work shows application of Rhizobium bio-fertilizer technology for Groundnut seeds and to study the increase in yield of pods during the crop season 2018. It was observed that, the yield increases by 20 to 25 %.

Keywords: *Bio-fertilizer, Rhizobium, Groundnut, Constraints etc.*

1. INTRODUCTION

The research paper is aimed to develop effective communication media for communicating the said technology to target group by result and method demonstrations in fields. The study also aims to motivate the other farmers of the locality to adopt leading to horizontal spread of technology information.

The sources of information affect the technology transfer and its dissemination and adoption by farmers. Deb and Sharma (1964) stated that, communication is the best method for the significant relationship for adoption of new farm practices. Patel and Pandya (1973) found that, the lot of farmers is depending on neighbors and relatives for getting information useful in Agriculture. Doiphode (1973) concluded that, many more farmers are followers of neighbors and relatives for new farm practices. The finding indicates that, cultural practices of crops, plant protection and new varieties were most wanted information needs by the farmers. In this investigation field demonstration were conducted in the houses, in the fields of sample farmers that include seed dressing by *Rhizobium* bio-fertilizer. It also includes the ratio of *Rhizobium* bio-fertilizer per kilograms of seeds. Application of *Rhizobium* bio-fertilizer in the fields of farmers showed positive impacts for changing their mind to do practice. It is meant to promote, motivate, inculcate and encourage people to go in for beneficial changes.

The aim of the present investigation was to use the *Rhizobium* bio-fertilizer technology for Groundnut seeds by Groundnut cultivars, which increases pod yield by 20 to 25%.

2. MATERIAL AND METHODS

The present study was carried out in the six villages of Kalwan (Maharashtra) during the crop season 2018. Forty eight farmer's from six villages i.e. eight from each village were selected and grouped into 4 classes. The researcher has chosen Completely Randomized Design (CRD) for field experiments. To study the effect of application of *Rhizobium* bio-fertilizer for Groundnut crop, land area selected of each farmer was one acre, and it is divided in to two equal plots i.e. half acre each, for experiment and

untreated half acre (control plot) (Thorve, Nagre and Joshi,1989). Farmers are requested to sow same variety i.e. SB-11 or JL-24 in both plots and remaining practices of Groundnut crop were same except fertilizer use policy. It is also advised to keep the distance of one 'Teephan' i.e. of nearly three feet in between untreated and treated plots. To determine per acre yield of experimental year of both plots, pods was harvested and weighed separately. The pod yield of treated plot was compared with untreated plot was recorded, tabulated and statistically analyzed.

In present study impact of the external factors are being same i.e. rainfall, climate, pest diseases and soil type on crop of experimental plot. Experimental group of farmers provided 250 Gms of *Rhizobium* bio-fertilizer packets for half acre plot and seed dressing was demonstrated at the field before sowing the seeds of Groundnut (Bhuiyan et.al. 1997). Out of 48 farmers 24 farmers were an experimental group and 24 were in control group.

3. RESULTS AND DISCUSSION

Table 1: Descriptive Statistics for treated *Rhizobium* bio-fertilizer and Chemical fertilizer: RBF_1, DC3C2, CF, CFBF, DC6C5, CF_0, CF_1, DC8C8...

Variable	N	Mean	StDev	CoefVar	Minimum	Q1	Median	Q3	Maximum
RBF_1	24	2.7400	0.4642	16.94	1.9900	2.3575	2.7500	3.0850	3.4900
DC3C2	24	0.4321	0.1110	25.70	0.2500	0.3400	0.4500	0.5350	0.6500
CF	24	2.2167	0.2125	9.59	1.8500	2.0125	2.2250	2.4000	2.5500
CFBF	24	2.4938	0.2397	9.61	2.0500	2.2500	2.5000	2.7375	2.8500
DC6C5	24	0.2771	0.0675	24.37	0.1500	0.2500	0.2500	0.3000	0.4000
CF_0	24	2.3208	0.2614	11.27	1.8500	2.0375	2.4050	2.5300	2.6500
CF_1	24	2.4583	0.2447	9.96	2.0000	2.2375	2.4750	2.6575	2.8000
DC9C8	24	0.1375	0.0902	65.59	0.00000	0.0675	0.1300	0.2000	0.3500
TCM_BC	24	2.2250	0.2958	13.29	1.6200	2.0000	2.1750	2.3875	2.9000
TCM_	24	2.2975	0.4193	18.25	1.5500	2.0500	2.2200	2.4375	3.7400
DC12C11	24	0.0725	0.2428	334.92	-0.2100	0.0000	0.0500	0.1000	1.1200

CV% small < 20%; indicates natural variability

Graph:- Shows Individual Value Plot Differences.

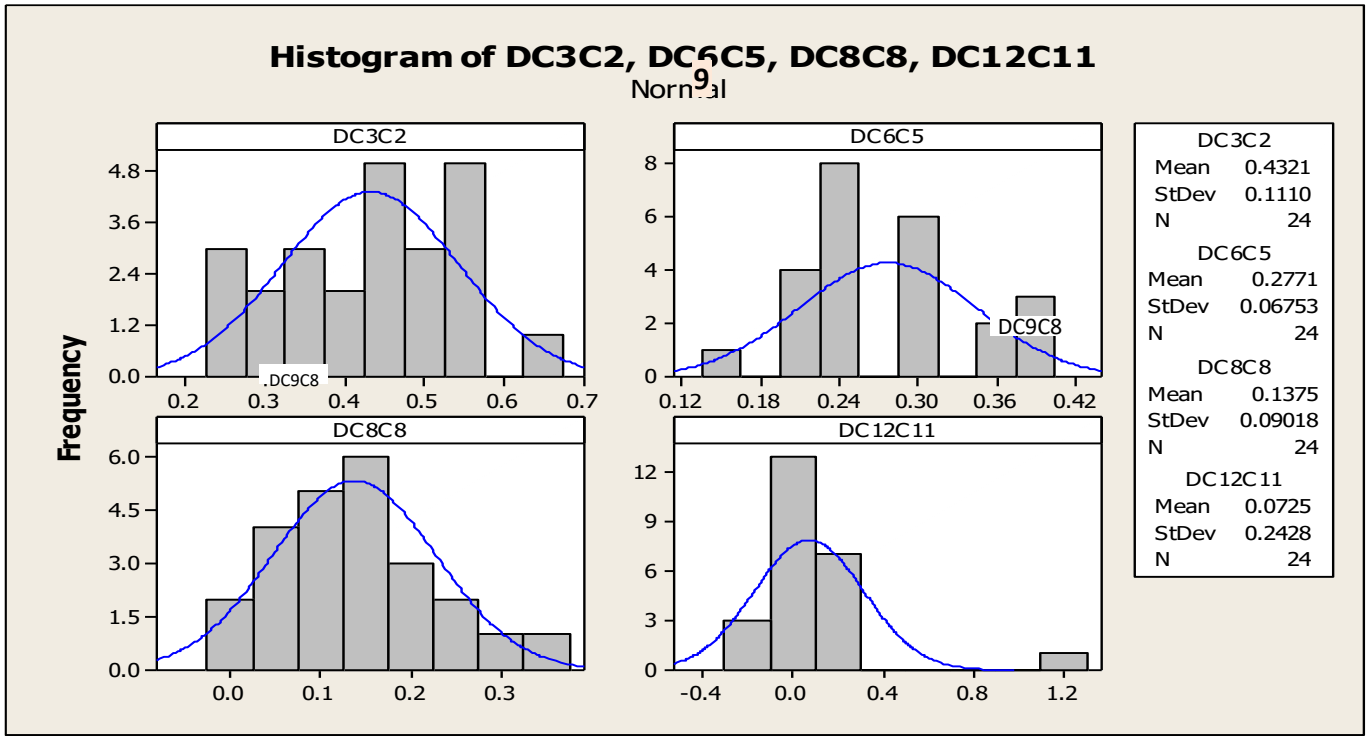
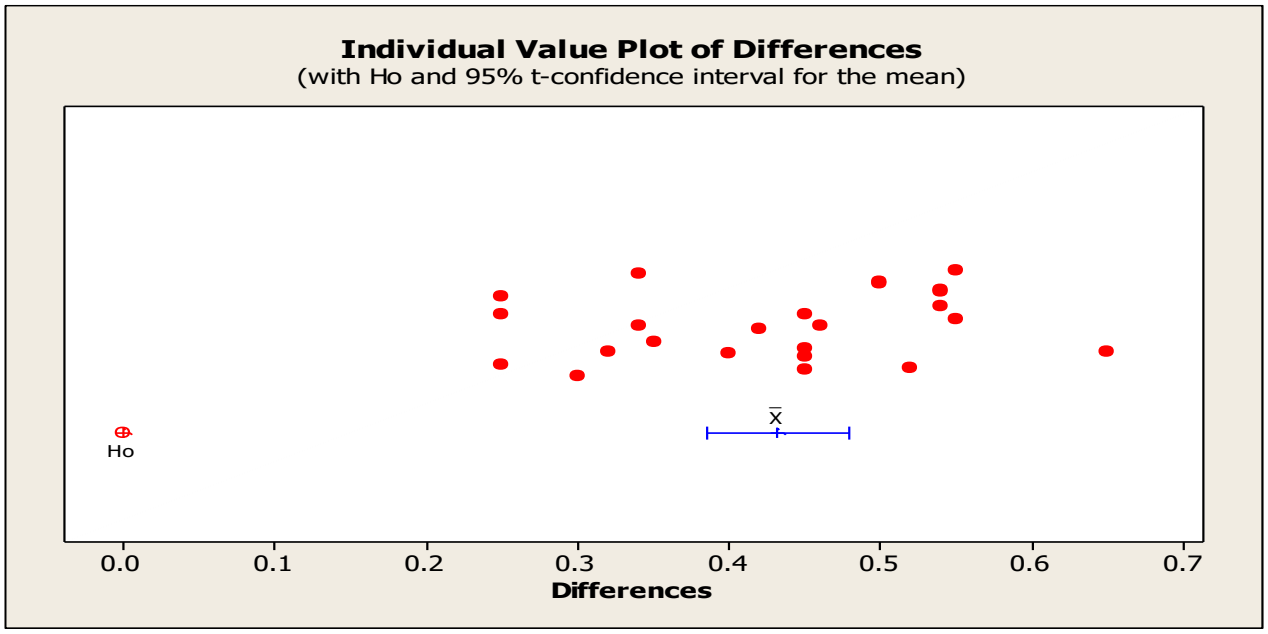


Table-2- Statistical analysis of yield- Paired T-Test and CI: RBF_1, RBF_0 Paired T for RBF_1 - RBF_0

Treatment	N	Mean	StDev	SE Mean
RBF_1	24	2.74000	0.46417	0.09475
RBF_0	24	2.30792	0.40953	0.08359
Difference	-	0.432083	0.111042	0.022666

95% CI for mean difference: (0.385195, 0.478972) T-Test of mean difference = 0 (vs not = 0): T-Value = 19.06** P-Value = 0.000 (** indicates test is highly significant at 5% and 1% level of significance) P-value is small (close to zero); it indicates that the treatment difference is statistically significant.

Individual Value Plot of Differences

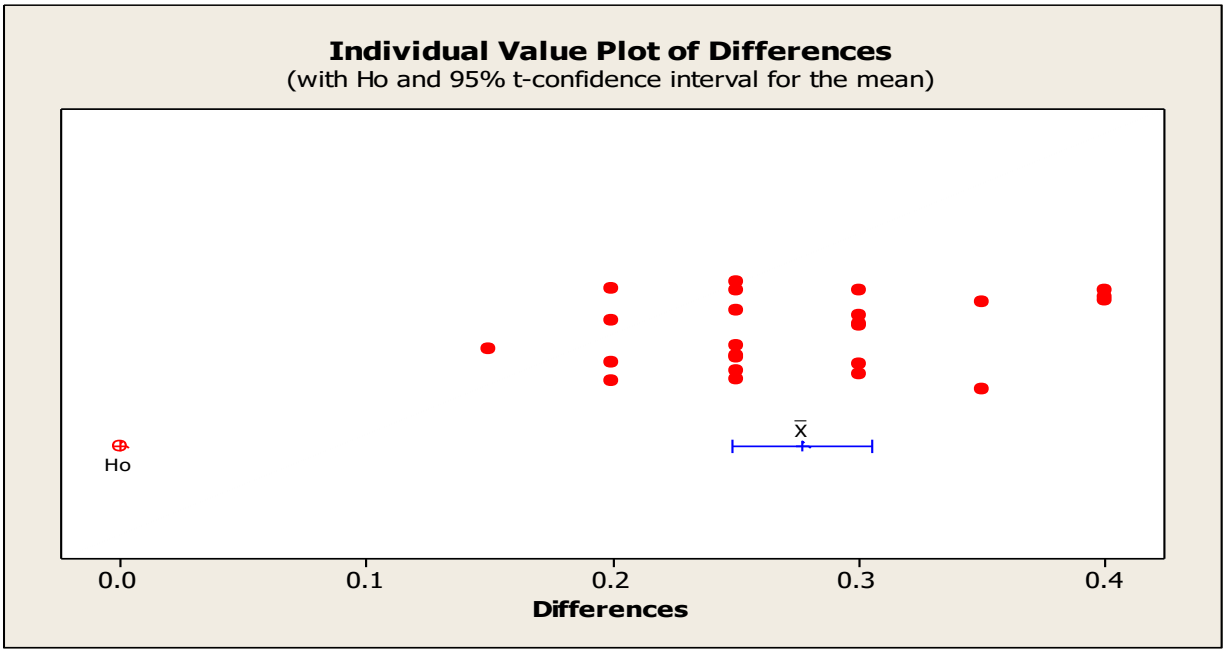


Paired T-Test and CI: CFBF, CF Paired T for CFBF – CF

Treatment	N	Mean	StDev	SE Mean
CFBF	24	2.49375	0.23971	0.04893
CF	24	2.21667	0.21247	0.04337
Difference	-	0.277083	0.067533	0.013785

95% CI for mean difference: (0.248567, 0.305600) T-Test of mean difference = 0 (vs not = 0): T-Value = 20.10** P-Value = 0.000 (** indicates test is highly significant at 5% and 1% level of significance) P-value is small (close to zero); it indicates that the treatment difference is statistically significant.

Individual Value Plot of Difference

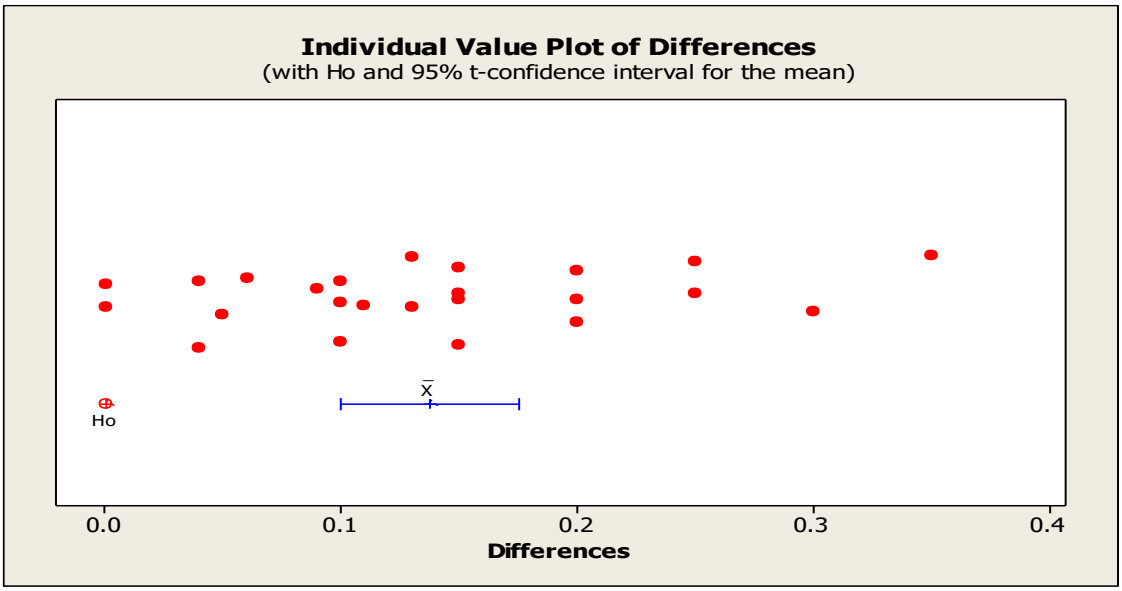


Paired T-Test and CI: CF_1, CF_0 Paired T for CF_1 - CF_0

Treatment	N	Mean	StDev	SE Mean
CF_1	24	2.45833	0.24473	0.04996
CF_0	24	2.32083	0.26145	0.05337
Difference	-	0.137500	0.090181	0.018408

95% CI for mean difference: (0.099420, 0.175580) T-Test of mean difference = 0 (vs not = 0): T-Value = 7.47** P-Value = 0.000 (** indicates test is highly significant at 5% and 1% level of significance) P-value is small (close to zero); it indicates that the treatment difference is statistically significant.

Individual Value Plot of Differences



In present investigation data of Groundnut pod yield by giving three different treatments was recorded and statistically analyzed i.e. *Rhizobium* bio-fertilizer only, *Rhizobium* bio-fertilizer and chemical fertilizer and chemical fertilizer only, yield of neighboring plots was also recorded. It was observed that, there was statistically significant difference between the yields of treated and untreated plots and rises up to 20 to 25%. (Raychaudhuri Mausumi, Raychaudhuri S. 2008). Thus the results shows that, because of the application of *Rhizobium* bio-fertilizer, the per acre yield of Groundnut pods increased. The results also prove that use of *Rhizobium* bio-fertilizer for Groundnut crop increases yield of subsequent crop, where the use of costly chemical fertilizers reduced at some extent. The results of present work are similar to the study of earlier workers like Omusub Nopamornbodi; Jirasak Arunsri; Thammauragul (1985), Bhuiyan et.al. (1997), Joshi and Bantilan (1998), Gaikawad and Saler (2006) and Raychaudhuri Mausumi, Raychaudhuri S. (2008).

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