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EFFICACY OF BIO-FERTILIZERS AND COMBINATIONS WITH CHEMICAL FERTILIZERS ON BIOCHEMICAL PARAMETERS OF OKRA (*ABELMOSCHUS ESCULENTUS* (L.)

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Abstract

The Present investigation was conducted during 2021 at Agricultureal Research Farm of Rama University, Mandhana, Kanpur (U.P), Studies on the "Efficacy of bio-fertilizer and the combinations with chemical fertilizers on chemical parameters of okra [*Abelmoschus esculentus* (L.) Moench]", revealed that Acidity, Ascorbic acid and moisture percent were maximized. when we use with Recommended dose of fertilizers , NPK 40 percent, PSB 40 percent, Azotobacter 40 percent and Azospirillum 65 percent.

Keyword: Okra, Fertilizer doses (RDF), NPK, PSB, Azotobacter, and Azospirillum.

Introduction:

Okra (Abelmoschus esculents (L.) Moench), also known as bhindi in India, lady's finger in England, and Gombo in the United States, belongs to the Malvaceae family. It may be found in both tropical and subtropical climates (Ahmed et al., 2006). It is an amphidiploid of A. tuberculatus with 2n=58 and an unknown species with 2n=72, with a somatic chromosomal number of 2n = 130. The genus Abelmoschus has 38 species. It is a plant that thrives in hot weather. It is one of the world's oldest agricultural crops, and it is now grown in a variety of countries. Okra has a high nutritional content and is an excellent supplement in impoverished nations where there has been typically a significant nutritional imbalance. Okra seeds contain around 20% protein (amino acid makeup comparable to soybean protein) and 20% oil (fatty acid composition similar to cotton seed oil) (Siemonsma and Hamon, 2002).

The immature fruits and leaves of *Abelmoschus esculentus* are used in soup as a thickening, according to Awodoyin and Olubode (2009), since they are a rich source of vitamins and minerals. The World Health Organization recommends eating okra because of its capacity to combat illness.

It's high in protein, carbohydrates, fats, minerals, iron, and iodine. Okra green fruits include 89.6% moisture, 1.9 g protein, 88 IU vitamin A, 0.07 mg thiamine, 0.1 mg riboflavin, 13 mg vitamin C, 0.7 g minerals such as 103 mg potassium, 6.9 mg sodium, 56 mg phosphorus, 66 mg calcium, 1.5 mg iron, 30 mg sulphur, and other nutrients (per 100 g edible parts) (Aykroyed, 1963). It's a good source of iodine, which can help with goitre treatment. It makes a wonderful and popular dish in Indian vegetable dishes, and it has a number of medicinal

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and nutritional benefits. Bio - fertilizers are living microorganisms that can fix atmospheric nitrogen into a form that plants can use, either by living freely in the soil or by being symbiotically coupled with plants (SubbaRao, 1993).

Biofertilizers are biological inputs that contain microorganisms capable of mobilising nutritional nutrients from non-usable to usable forms (Tien et al., 1979). Both symbiotic and free-living bacteria, as well as blue green algae, fix nitrogen biologically. 80 percent of the biologically fixed nitrogen on land comes from symbiotic nitrogen fixation. Nitrogen-fixing bacteria are quite picky about which legume species' roots they infect, infiltrate, and form root nodules on (SubbaRao, 1993).

In Indian agriculture, Azotobactor, a plant of economic value, has been harnessed. Various workers reported finding several free-living bacteria in plant roots that convert atmospheric nitrogen to useful ammoniacal form. Both symbiotic and free-living bacteria, as well as blue green algae, fix nitrogen biologically. 80 percent of the biologically fixed nitrogen on land comes from symbiotic nitrogen fixation. Nitrogen-fixing bacteria are quite picky about which legume species' roots they infect, infiltrate, and form root nodules on (SubbaRao, 1993). In Indian agriculture, Azotobactor, a plant of economic value, has been harnessed. Various workers reported finding several free-living bacteria in plant roots that convert atmospheric nitrogen to useful ammoniacal form.

Material and methods:

The experimental material for the present study consisted of the seed of okra cultivar. (Pusa Sawani) was collected from Indian Agricultural Research Institute (New Delhi). The experiment was conducted using (RBD) with three replications at Okra, Fertilizer doses (RDF), NPK, PSB, Azotobacter, and Azospirillum (U.P.) were taken for the investigation during Kharif season of 2021. Treatments **T_0** (RDF), **T_1** *Azotobacter* + 40 percent NPK, **T_2** PSB + 40 percent NPK, **T_3** *Azospirillum* + 65 percent NPK, **T_4** PSB + *Azotobacter* + 40 percent NPK, **T_5** PSB +*Azospirillum*+ 65 percent NPK, **T_6** PSB + *Azospirillum* + *Azotobacter* 40 percent, **T_7** *Azotobacter* + *Azospirillum* 40 percent **T_8** PSB + *Azospirillum* 65 percent. Observation were recorded for Acidity percent, Vitamin-C (mg/100gm) and Moisture content percent.The data so obtained were analysed statically.

Result and discussion:

Data assembled towards acidity content in okra due to effect of different bio-fertilizer present in Table-1 showed that influence of NPK and bio-fertilizer decreased acidity content in okra significantlyT_5 produced the lowest rate of acidity (0.125%) followed by T_1andT_6 (0.320 %), T_8(0.460%). The highest acidity content was noted with T_0 (0.747%).

The maximum Vitamin-C (26.30 mg/100g) was recorded in T_4 (PSB + Azotobacter + 40 percent NPK) and lowest Vitamin-C (10.34 mg/100g) was noted with T_0 (RDF). This is agreement with the result of **Upadhyay*et al*. (2007)** recorded maximum vitamin C, total

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carotenoids, total carbohydrate and crude fiber content in comprising FYM 20 t/ha^{-1} + PSB (T_3) among 16 treatment combinations including controls.

T_0 (RDF) contain lowest rate of moisture (80.012%) and the highest moisture content (93.733 %) was noted with T_6 (PSB + *Azospirillum* + *Azotobacter* 40%). Similarly, this is quite close to the reported of **Premsekhar and Rajashree,** (2009) who has obtained this type of result, while maximum moisture (90.36) in the control.

Table 1 Efficacy on bio-fertilizer and the combinations with chemical fertilizers on chemical parameters of okra [*Abelmoschus esculentus* (L.) Moench]

Treatment	**Acidity (%)**	**Vitamin-c (mg/100)**	**Moisture (%)**
T_0 Recommended dose of fertilizers(RDF)	0.747	10.34	80.012
T_1 *Azotobacter* + 40% NPK	0.320	15.250	88.463
T_2 PSB + 40% NPK	0.513	17.540	89.447
T_3*Azospirillum* + 75% NPK	0.127	21.533	91.102
T_4 PSB + *Azotobacter* + 40% NPK	0.173	26.530	82.380
T_5 PSB + *Azospirillum* + 40% NPK	0.125	20.340	90.497
T_6PSB + *Azospirillum* + *Azotobacter* 40%	0.320	16.853	92.533
T_7 *Azotobacter* + *Azospirillum* 40 %	0.647	15.763	86.583
T_8 PSB + *Azospirillum* 65%	0.320	18.852	87.253
C.D. at 5%	**0.116**	**3.077**	**3.412**
S.E.(m)±	**0.045**	**1.018**	**1.392**

Conclusion:

On the basis of present investigation, it may be concluded that the application of inoculants (PSB + *Azotobacter* +40 percent NPK) increased growth yield and nutrional quality of okra. Therefore, it is recommended to the okra growers for the application of inoculants (PSB + *Azotobacter* + 40 percent NPK) for higher production and quality of okra under Rama university kanpur condition.

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