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Bioinoculants and their Utility in Flower Production

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Introduction

- ✓ Flowers are grown since ancient times and they are important for aesthetic, social and economic considerations.
- ✓ Flowers are symbolized for purity, beauty, peace, love, passion and also provide excellent appearance in outdoor and indoor decorations.
- ✓ Different agro-techniques play an important role in growth and development of various flower crops, among them nutrition is one of the most important aspects which directly influences the flower yield and quality.
- ✓ Flowers grown by organic methods have longer vase life.
- ✓ For edible flowers which are used in drinks, jellies, salads, soups, syrups and many other dishes should be grown organically, no chemical fertilizers should be used.
- ✓ India is the third largest producer and consumer of fertilizers in the world (after China and USA) accounting for 12% of world production of N & P nutrients and 12.6% of world consumption of NPK nutrients.
- ✓ Fertilizers supply essential plant nutrients, mainly Nitrogen (N), Potash (K) and Phosphorous (P).
- ✓ Use of more chemical fertilizers has left our soils degraded, polluted, less productive and posed severe health hazards.

Need for bio fertilizers

- ✓ Use of chemical fertilizers leads to the pollution and contamination of soil
- ✓ Demand is much higher than the availability
- ✓ Energy crisis and increasing cost of fertilizers
- ✓ Bio fertilizers are economical, eco-friendly, more efficient, productive and accessible to marginal and small farmers

Bio-inoculants or Biofertilizers

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- ✓ Biofertilizers (living fertilizer) are a mixture of micro-organisms which are capable of mobilizing nutritive elements through biological process.
- ✓ They are also called as Bio-inoculants.
- ✓ Biofertilizers can be supplement to chemical fertilizers. They contribute plant nutrients through N_2 fixation, phosphate solubilization, maintenance of soil reaction and improvement of soil fertility.
- ✓ Biofertilizers are effective strains of micro-organisms like bacteria, algae, fungi alone or in combination.
- ✓ In commercial scale, biofertilizers are available in the form of Rhizobium, Azotobacter , Azospirillum , Azolla, Blue Green Algae (BGA), Vesicular arbuscular mycorrhizae (VAM) and Phosphate Solubilizing Microorganisms (PSM).
- ✓ When microorganisms are incorporated in soil, they increase crop production by Biological Nitrogen Fixation, solubilization of fixed phosphate, mobilizing unavailable Potash & other mineral nutrients.
- ✓ They also increase synthesis of growth promoting substances such as auxins and gibberellins etc

Common microorganisms as Bio-fertilizers

Biofertilizers	**Contribution**
Rhizobium	Fixes 50-200 kg N/ha. Increases yield by 10 – 30%.
Azotobacter	Fixes 20-25 kg N/ha. Increase by yield10-15%.
Azospirillum	Fixes 20-40 kg N/ha. Increases yield by 10-20%.
Phosphate Solubilizers	Increases yield by 5-30%.
Blue Green Algae {BGA}	Fixes20-30 kg N/ha.
Azolla	Fixes 40-80 kg N/ha.
VAM	Increases yield by 30-50%. enhances uptake of P, Zn, S and Water

Role of Biofertilizers

- ✓ Contribute plant nutrients through biological nitrogen fixation and solubilization of fixed phosphate.

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- ✓ Cheaper in cost and reduce chemical fertilizer consumption.
- ✓ Provide atmospheric nitrogen directly to the plants.
- ✓ Release of vitamins, hormones like auxins and gibberellins etc.
- ✓ Increases 10-20 per cent of crop yield.
- ✓ Controls and suppress soil borne diseases.
- ✓ Improve soil properties and sustain soil fertility.
- ✓ Convert plant nutrients in available form.
- ✓ They are eco- friendly and pollution free.

Precautions In the Use of Biofertilizers

- ✓ Biofertilizers should be in good quality which containing minimum 10^7/gm viable microbial count.
- ✓ Preserve the biofertilizers away from sunlight, heat and moisture.
- ✓ Store them in cool and dry place at room temperature of 25-28^{0}C.
- ✓ Chemical fertilizers and biofertilizers should not be applied together as there are possibilities of the microorganisms being killed by them.
- ✓ Use only packets or bottles on which batch no, name of manufacturer and expiry date is mentioned.
- ✓ Do not mix biofertilizer in warm or hot water.
- ✓ Seed coated with biofertilizers should not be treated with fungicides and pesticides.

Methods for application of fertilizers

S.No.	Method of Application	Crops	Dose/Acre	Water	Ratio BF & water
1	Seed application	All crops sown through seeds	200g	400 ml	1:2
2	Setts treatment	Setts of sugarcane, base of banana suckers	1 or 2kg	50 -100 litres	1:50

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3	Seedling method	Rice, tomato, chilly, cabbage, cauliflower & flower crops	1 kg	10 litre	1:10
4	Soil application	All crops	2 kg	for wetting	***

Conclusion

- With the changing scenario of Indian floriculture, the biofertilizers play an important role in modern technology through nitrogen fixation, phosphate solubilization and decomposition of organic matter.
- The response of biofertilizers varies with flower species. The application of biofertilizers like Azotobacter, Azospirillum and PSM @ 2-3 kg/ha. and VAM @ 2g/plant and its combination found effective.