

Essentiality of Macronutrients in Flower Crops

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SUMMARY

Macronutrients are most essential nutrients for the plant growth, development and successful production of flower and ornamental crops under open field and protected condition. Macronutrients like nitrogen, phosphorus and potassium directly affect the plant growth, development, yield and flowering behavior of the flower crops. It also involved in the various plant physiological processes and it is constituent of nucleic acid, protoplasm and carbohydrate synthesis. It also play an important role in the processes of photosynthesis, respiration, nitrogen fixation and enzyme regulation. Nitrogen, phosphorus and potassium are the most necessary and important for plant growth and development. Calcium, magnesium and sulphur are also essential for the successful production of flowers. In the present article, we discuss on the importance and essentiality of major nutrients in the production of flower crops.

INTRODUCTION

Flowers are the symbol of love, beauty, purity and tranquility. Flowers are closely associated with the mankind from the ancient age. In the life of human beings the place of flowers are very important. It is the general saying that the man born with flowers, living their life with flowers and finally departs with flowers. Flowers are generally used in the man's day to day life for the social, religious, traditional functions, decorations, decorating the hairs and worshipping the god. Flowers like rose, gerbera, chrysanthemum, carnation, gladiolus, tuberose, marigold, jasmine, gaillardia, orchids etc. have very high demand in the market. Flowers are used as a cut flower and loose flower. Loose flowers are generally used for the preparations for the garland, veni, gajra, extraction of essential oil and cut flowers are used for the preparations of bouquets, floral decorations, wreaths, floral arrangements, decorating in the vase etc. Macronutrients play a vital role in the production of better quality flower and plant growth. The primary major nutrients nitrogen, phosphorus and potassium play very important role in the plant growth, development, flowering and flower production directly. The secondary major nutrients calcium, magnesium and sulphur are also important for the plant growth of flower crops. Macronutrients are involved in the various plant physiological processes and also involved in photosynthesis, respiration, nitrogen fixation, enzyme regulation etc. It is also a constituents of nucleic acid, protoplasm and increased carbohydrate synthesis, amino acids which results better plant growth. Macronutrients are most important for proper growth, development, flowering and flower production of flower crops.

Role of macronutrients and their effect on flower crops

Role of Nitrogen

Nitrogen is most important primary nutrient which directly affect the plant growth, development and flowering behavior of flower crops. It is an important constituent of nucleic acid, protoplasm and increased carbohydrates synthesis, amino acid etc. due to which the phyto-hormones like cytokinins, gibberellins and auxins have been synthesizes which ultimately resulting in plant growth. Proper and optimum dose of nitrogen increases photosynthetic processes, leaf area, leaf area duration and net assimilation rate. The maximum leaf area and leaf biomass of plants are the determinant of higher flower yield. It gives green color to the plant, promotes leaves and stem growth and other vegetative parts. Its deficiency symptoms first occur on the older leaves. Deficiency of nitrogen causes retarded growth, appearance of chlorosis, red and purple spots on the leaves and stunted growth of the plant.

Effect of nitrogen on growth, flowering and yield of different flower crops

Maharnor *et al.* 2011 studied the effect of different levels of nitrogen on growth and yield of African marigold and found that the maximum stem diameter, number of primary branches plant⁻¹, plant spread, maximum flower yield plant⁻¹, flower yield ha⁻¹ with an application of nitrogen 150 kg ha⁻¹. Kumar *et al.* 2016 reported that an application of nitrogen 150 kg ha⁻¹ recorded maximum plant height, plant spread, stem girth, number of secondary branches plant⁻¹, and also showed earliness in flowering, increased flower stalk length, flower diameter,

ray florets, number of flower buds plant⁻¹, duration of flowering as well as field life in China aster cv. Kamini. Vinayak *et al.* 2017 revealed that an application of nitrogen 100 kg ha⁻¹ recorded maximum plant height, plant spread, number of branches plant⁻¹, days required for spike initiation, number of spikes, number of florets spike⁻¹, spike length and rachis length and the treatment 100 kg ha⁻¹ nitrogen considered superior in salvia.

Role of phosphorus

Phosphorus is also one of the most important major nutrient for the plant growth, development and flowering behavior. Phosphorus plays vital role in energy storage and transfer. It is a constituent of nucleic acid, phospho-lipids, phytin and involved in the plant processes of energy metabolism, photosynthesis, respiration, nitrogen fixation and enzyme regulation. It is important component of seed, promotes early flowering and produce better quality of the plants and flowers. Deficiency of phosphorus reduces the leaf expansion, leaf surface area and number of leaves.

Effect of phosphorus on growth, flowering and yield of different flower crops

Akter *et al.* 2017 conducted field trial to determine the effect of different levels of phosphorus on gladiolus and found highest corm yield and number of spikes ha⁻¹ with an application of phosphorus 140 kg ha⁻¹. Dangi *et al.* 2019 conducted an experiment to study the effect of different levels of phosphorus on growth and flowering of marigold and recorded the maximum plant height at an application of phosphorus 20 kg ha⁻¹, maximum number of branches plant⁻¹ at 100 kg P ha⁻¹, maximum number of flowers plant⁻¹ at peak bloom stage at 80 kg P ha⁻¹, fresh flower diameter at 100 kg P ha⁻¹ and fresh weight of flower at 100 kg P ha⁻¹. So, it can be concluded that 100 kg P ha⁻¹ best for obtaining maximum yield.

Role of potassium

Potassium is an important major nutrient which directly affect the plant growth and yield of flower crops. Potassium plays an important role in the activation of enzymes which serves as catalysts for chemical reactions. Potassium plays an important role to regulate the opening and closing of stomata. Proper functioning of stomata are essential for photosynthesis, water, nutrient transport and plant cooling. When water supply is short potassium is pumped out of the guard cells and tightly close the spores to prevent loss of water and minimize drought stress to the plant. Potassium helps in formation of chlorophyll and proteins which are important for photosynthesis and it increases the quality of flower, plant growth and also plays an important role in the formation of seed. Potassium increases the disease resistant capacity of the plant.

Effect of potassium on growth, flowering and yield of different flower crops

Zeb *et al.* 2015 applied the different levels of potassium to determine the effect of potassium on growth and flower quality of chrysanthemum and revealed that an application of potassium 200 mg pot⁻¹ recorded minimum days to flowering, maximum plant height, number of leaves plant⁻¹, fresh flower weight and dry flower weight. Nikam *et al.* 2018 investigated the influence of nitrogen and potassium on annual chrysanthemum and reported that an individual application of potassium 75 kg ha⁻¹ produced highest plant height, stem diameter, spread of plant and leaf area. Devi *et al.* 2020 stated that an application of potassium 210 kg ha⁻¹ in gladiolus under acidic soil condition of Manipur, gave the highest number of leaves, plant height, leaves length, weight of corm, corm diameter, number of cormels and corm yield ha⁻¹.

Effect of macronutrients in combination on growth, flowering and yield of different flower crops

Kour and Sharma 2012 recorded that an application of nitrogen 30 g m⁻², phosphorus 30 g m⁻² and potassium 20 g m⁻² improved sprouting time, leaves plant⁻¹, leaves length, plant height, spike initiation, spike length, spikes clump⁻¹, bulblet weight and size in tuberose. Srivastava *et al.* 2017 applied the nutrients NPK (19:19:19) at the rate of 0, 30 and 45 g m⁻² month⁻¹ at 15 days interval to the three varieties of gerbera viz., Dune, Rich and Zingard and reported that the var. Dune had highest duration of flowering, flowers plant⁻¹, stalk thickness, var. Rich recorded maximum petals flower⁻¹, length of petal, flower diameter and the var. Zingard recorded earliness in bud opening with highest vase life with an application of NPK 19:19:19 at the rate of 45 g

m⁻² month⁻¹. Pahare and Misra 2020 studied the effect of NPK on plant growth and quality of *Lilium* hybrid Tresor under polyhouse and open condition and found the results that, in polyhouse foliar application of NPK 10:10:10 @ 5g/l thrice a week observed most suitable in relation to plant height, number of leaves plant⁻¹, plant spread, spike length, spike diameter, flower length, flower diameter, bud length, bud diameter, days to bud emergence, number of buds plant⁻¹, vase life and in open condition plant height, number of leaves plant⁻¹, plant spread, spike length, spike diameter, flower length, flower diameter, bud length, bud diameter, days to bud emergence and number of buds plant⁻¹ and vase life as compared to rest of the treatments.

Role of calcium

Calcium is also an important major nutrient in flower crops. It is a constituent of middle lamella of cell wall which gives turgidity of cell, highly required in telophase for cell plate formation. It is a structural component, neutralizes organic acids, essential in growing point especially root tips. Its deficiency causes stem break disorder in tuberose, sleepiness in carnation, topple or bud rot in lily and colour break disorder of spathe in anthurium etc.

Role of magnesium

Magnesium is also an important nutrient for the proper growth, development and better production of flower crop. It is constituent of chlorophyll, chromosomes, polyribosomes. It is a carrier of phosphorus in the plants. It also involves in the various plant processes.

Role of sulphur

Sulphur is an important nutrient for the flower crops. It is a constituent of amino acids like methionine, cysteine, cystine and vitamins (like glutathione, biotin and thiamine) lipoic and acetyl Co-A. Sulphur is associated with aromatic compounds and creates a type of fragrance, aroma and smell. It also helps in forming and stabilizing the tertiary structure of enzymes and other proteins and also nodule formation.

CONCLUSION

From the present discussion, we can conclude that the nitrogen, phosphorus and potassium are the most important nutrients for the proper plant growth, development and better production of flower and its deficiency may cause deficiency disorders in the flower crop which affect the growth and flower production. Calcium, magnesium and sulphur are also important nutrients for the better flower production. The main reason for the lower yield and poor quality of flower is improper and imbalance use of macronutrients. So, the proper management and application of macronutrients for the flower crop is essential.

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