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EFFECT OF INTEGRATED NUTRIENT MANAGEMENT ON GROWTH OF THE CHINA ASTER (*CALLISTEPHUS CHINENSIS* L. NEES) cv. PIT AND POT

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Abstract

The present investigation entitled "Effect of Integrated Nutrient Management on growth of China aster (*Callistephus chinensis* L. Nees) cv. Pit and Pot" was under taken at Department of Horticulture, Allahabad School of Agriculture, Sam Higginbottom Institute of Agriculture, Technology and Sciences (SHIATS), during the year 2015-16. The experiment was laid out in Randomized Block Design with 12 treatments replicated thrice. The treatments comprised of FYM, vermicompost and bio-fertilizer (Azospirillum & PSB) with 50% RDF and 75% RDF in different combinations including control (No fertilizers and manures) and 100% RDF. The results revealed that application of 75% RDF + FYM @ 2t/ha + Vermicompost @ 0.6 t/ha + Azospirillum @ 2.5 kg/ha + PSB @ 2.5 kg/ha (T_7) produced significantly maximum number of flowers per plant (48.82), maximum plant height (64.83 cm), number of leaves per plant (91.06).

Key words : China aster, N, P, K, FYM, azospirillum, PSB.

Introduction

China aster (*Callistephus chinensis* L. Nees) is an important flowering crop of our country, which belongs to the family *Asteraceae*. Symbolise purity, peace, love, beauty and passion. It is native to china and has spread to Europe and other tropical countries during 1731 AD (Deasi, 1967). It is one of the most important annual flower crops grown in most parts of the world. Among annual flowers, it ranks third next to chrysanthemum and marigold. It is hardy, free blooming, annual grown all over the world for its cut flowers. Aster is a short duration crop acclimatized to varying agro climatic conditions. It is also found suitable for intercropping in coconut gardens (Janakiram, 1997).

Boodley (1975) considered quality to be a function of nutrient level. Toxic levels of nutrients adversely affect aster grown under field condition in india meager. Proper combination of fertilizers play a vital role in production of vigorous plants having maximum number of shoots and leaves, which have a positive impact on quality flower production and prolonged flowering period (Sultana *et al*., 2006 and Zhang *et al*., 2010). No attempts have been made so far to study the efficiency of organic as well as inorganic fertilizers on growth of china aster, besides the above facts, to get higher flower yield, the use of biofertilizers (*viz*. Azatobacter, Azospirillum and Phoaphobacteria) along organic manures with balance use of inorganic fertilizers of paramount important in horticulture in general and floriculture in particular, since the INM concept is one of the ecofriendly approaches. The use of green manures and other organic matter can improve soil structure, improve nutrient exchange and maintain soil health and that is why interests has been raising towards organic farming (Mitra, 2010), maintenance of soil pH by the incorporation of FYM (Shylaja *et al*., 2003) observed that capability of FYM in improvement of available NPK. Use of biofertilizers reduces per unit of consumption of inorganic fertilizers and increase the quality and quantity of flowers (Syamal *et al*., 2006). Biofertilizer have been found helpful in proliferation and survival of beneficial microorganisms and improves soil properties leading to sustained soil fertility (Harris *et al*, 1966). By the addition of PSB, the unavailable forms Phosphorus is converted to the available forms, increasing

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p uptake and leading to increased yield.

Materials and Methods

The present experiment was conducted at Research field, Department of Horticulture, Allahabad School of Agriculture, SHIATS, Allahabad, during 2015-2016, in a Randomised Block Design replicated with thrice. Healthy and disease free seedlings of China aster (*Callistephus chinensis* L. Nees) cv. Pit and Pot were planted on flat bed system in last week of November 2015, maintaining a spacing of 30cm × 45cm. The fertilizer combinations were prepared as per the requirement and application with soil to each treatment and replication at 30 days intervals and observations recorded. Data on plant growth, yield and quality of China-aster characters were recorded when the plants were fully grown. Treatments are 12 *viz*, $\mathbf{T_1}$- control, $\mathbf{T_2}$- 100% RDF (120:80:80 kg/ha NPK), $\mathbf{T_3}$- 75% N P K kg/ha + FYM @ 6 t/ha, $\mathbf{T_4}$- 75% N P K kg/ha + Vermicompost @ 2 t/ha, $\mathbf{T_5}$- 75% N P K kg/ha + Azospirillum @ 2.5kg/ha, $\mathbf{T_6}$- 75% N P K kg/ha + PSB @ 2.5kg/ha, $\mathbf{T_7}$- 75% N P K kg/ha + FYM @ 2t/ha +Vermicompost @ 0.6t/ha + Azospirillum @ 2.5kg/ha + PSB @ 2.5kg/ha, $\mathbf{T_8}$- 50% N P K kg/ha + FYM @ 12t/ha, $\mathbf{T_9}$- 50% N P K kg/ha + Vermicompost @ 4 t/ha, $\mathbf{T_{10}}$- 50% N P K kg/ha + Azopirillum @ 5kg/ha, $\mathbf{T_{11}}$- 50% N P K kg/ha + PSB @ 5kg/ha, $\mathbf{T_{12}}$- 50% N P K kg/ha + FYM @ 4 t/ha + Vermicompost @ 1.2 t/ha + Azospirillum @ 5kg/ha + PSB @ 5kg/ha.

The growth observations were recorded in five plants randomly selected in each treatment. Significantly differences were observed for growth parameters like (plant height, plant diameter, Number of leaves / plant , Number of branches/plant) recorded by measuring scale.The data obtained was statistically analyzed by Panse and Sukhatme (1985).

Results and Discussion

An investigated was carried out to find out the effect of Integrated Nutrient Management on growth, yield and quality of China-aster (*Callistephus chinensis* L. Nees). The best treatment of China-aster was prepared by using application of 75% N P K kg/ha + FYM @ 2t/ha + Vermicompost @ 0.6t/ha + *Azospirillum* @ 2.5kg/ha + PSB @ 2.5kg/ha ($\mathbf{T_7}$). It resulted in maximum plant height (64.83 cm), plant spread (32.86 cm), Number of leaves per plant (91.06), Number of branches per plant (31.46) And maximum Days to first bud initiation (68.93), Days to 50% bud initiation (76.13), Days to first flowering (82.73), Days to 50% flowering (87.83) found in $\mathbf{T_5}$ - 75% N P K kg/ha + *Azospirillum* @ 2.5kg/ha. Inoculation of *Azospirillum* and PSB, enhanced the cell

Table 1 :

Treatments	Plant height (cm)	Plant spread (cm)	Number of leaves per plant	Number of branches/plant	Days to first flower bud initiation	Days to 50% bud initiation	Days to first flowering	Days to 50% flowering
T_1	49.03	26.4	67.63	24.13	71.20	81.70	84.36	89.50
T_2	53.90	26.53	70.03	25.03	69.10	74.53	80.53	84.03
T_3	54.73	28.00	81.83	25.93	64.53	70.96	78.90	83.56
T_4	51.26	27.50	72.20	25.53	66.40	74.20	80.70	85.53
T_5	59.60	26.00	72.03	26.86	68.93	76.13	82.73	87.83
T_6	55.70	26.36	69.10	25.93	63.30	71.03	78.63	85.36
T_7	64.83	32.86	91.06	31.46	62.10	70.10	77.86	81.96
T_8	52.50	27.86	72.56	24.70	65.86	72.06	81.33	87.23
T_9	52.20	26.76	81.70	25.80	63.13	71.33	78.86	83.86
T_{10}	51.33	26.13	63.43	27.30	67.63	73.16	80.96	84.53
T_{11}	55.33	28.53	70.03	26.70	64.43	73.53	80.13	85.26
T_{12}	62.96	31.80	84.66	28.33	62.30	70.76	78.10	82.40
C.D.at 5%	6.20	3.01	11.62	3.38	2.88	2.02	1.61	1.57

division and enlargement and also produced growth hormones, which is possible reason for increase growth. These results were in line with the findings of Ravichandran in crossandra and Mononmani in Jasmine. Vermicompost enhanced the microflora and enzymatic activity which might have augmented the plant growth. Similar findings have been reported by Nethra *et al*. (1999) in China aster and Kusuma in golden rod. The production of increased number of flowers per plant and flower yield per acre might be due to the indirect effect of more number of branches as estimated and developed by the influence of inorganic fertilizers along with organic manures and biofertilizers.This was in conformity to the findings of Chandrikapure *et al*. (1999) in marigold and Bhavanishankar and Vanagamudi in crossandra.

Conclusion

The study gives tremendous scope for the yield improvement in China aster cv. Pit and pot with the Integrated Nutrient Management practices. The treatment $\mathbf{T}_7$ - 75% N P K kg/ha + FYM @ 2t/ha + Vermicompost @ 0.6t/ha + *Azospirillum* @ 2.5kg/ha + PSB @ 2.5kg/ha was found to be better in the investigation on integrated management studies in China aster cv. Pit and pot.

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