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EFFECT OF INTEGRATED NUTRIENT MANAGEMENT ON YIELD PARAMETERS OF MEDICINAL COLEUS (*COLEUS FORSKOHLII* BRIQ.)

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ABSTRACT

Medicinal coleus is one of the most important medicinal crop in India. It plays an important role in medicinal industries. The demand of tuberous roots are high but the production is low. Therefore, the research was conducted to know the "Effect of Integrated nutrient management on yield of medicinal coleus (*Coleus forskohlii* Briq.)" at Sirukalathur village, Ariyalur District – Tamilnadu during 2018-2020. The experiment was laid out in randomized block design with ten treatments and three replications. The plants are treated by using different combination of organic manures (Fym, neem cake and castor cake) and inorganic fertilizers (NPK) along with bio-fertilizers (Azospirillum and Azotobacter). Among these various treatments the plants treated by T_5 (75 % RDF + FYM @ 15 t ha^{-1} + Castor cake @ 2 t ha^{-1} + Azotobacter @10 kg ha^{-1}) is influenced the yield attributes of medicinal coleus like, maximum number of tuberous roots $plant^{-1}$, root length, root girth and fresh and dry weight of tuberous roots ha^{-1}.

Keywords : Medicinal coleus, integrated nutrient management, yield.

Introduction

Coleus forskohlii Briq. belongs to the family of Lamiaceae and is one of the most significant potential medicinal crops. It consists of 236 genera and 7000 species, the largest family of the order Lamiales. The plants are generally aromatic with colourful leaves and have been used since ancient times for their pharmaceutical properties. *Coleus forskholii* Briq. is used as a tonic in South India. Roots are used to cure worms. The root paste allays burning in festering boils. Root is ground in mustard oil and paste is applied on eczema and skin infections. It is also used as an anti-aging and antioxidant agent and as a remedy for heart, abdominal and respiratory disorders. In Uttarakhand, it has been used by the tribal population in the treatment of various ailments like psoriasis, skin infections, wound healing, stomach and other ulcers, and cardiac disorders (Rana *et al*., 2016). The combined application of nutrients provide balanced nutrients to the plants. It increase the yield attributes in medicinal coleus through proper nutrient management.

Materials and Methods

An experiment was entitled with "Effect of Integrated nutrient management on yield of medicinal coleus (*Coleus forskohlii* Briq.)" was carried out at Sirukalathur village, Ariyalur District - Tamilnadu during the year 2018-2020. The research was conducted by using randomized block design with ten treatments and three replications. The different combinations of treatments such as, T_1- 100 % RDF + FYM @ 15 t ha^{-1}, T_2 - 75 % RDF + FYM @ 15 t ha^{-1} + Neem cake @ 1 t ha^{-1} + Azospirillum @ 10 kg ha^{-1}, T_3 - 75 % RDF + FYM @ 15 t ha^{-1} + Neem cake @ 2 t ha^{-1} + Azospirillum @ 10 kg ha^{-1}, T_4 - 75 % RDF + FYM @ 15 t ha^{-1} + Castor cake @ 1 t ha^{-1}+ Azotobacter @ 10 kg ha^{-1}, T_5 - 75 % RDF + FYM @ 15 t ha^{-1} + Castor cake @ 2 t ha^{-1} + Azotobacter @ 10 kg ha^{-1}, T_6 - 50 % RDF + FYM @ 15 t ha^{-1} + Neem cake @ 1 t ha^{-1} + Azospirillum @ 10 kg ha^{-1}, T_7 - 50 % RDF + FYM @ 15 t ha^{-1} + Castor cake @ 1 t ha^{-1} + Azotobacter @ 10 kg ha^{-1}, T_8 - 50 % RDF + FYM @ 15 t ha^{-1} + Neem cake @ 2 t ha^{-1} + Azospirillum @10 kg ha^{-1}, T_9 - 50 % RDF + FYM @ 15 t ha^{-1} + Castor cake @ 2 t ha^{-1} + Azotobacter @10 kg ha^{-1} and T_{10} - Control. The observations obtained from yield parameters viz., number of tuberous roots $plant^{-1}$, root length, root girth and fresh and dry weight of tuberous roots ha^{-1}. The observed data was analyzed by using statistical method of Panse and Sukhatme (1985).

Results and discussion

The results of an experiment was reported that the plants supplied by 75 % RDF + FYM @ 15 t ha^{-1} + Castor cake @ 2 t ha^{-1} + Azotobacter @ 10 kg ha^{-1} (T_5) is influenced the maximum yield parameters viz., maximum number of roots $plant^{-1}$ (16.23), root length of medicinal coleus (22.99 cm), highest tuberous root girth (1.52 cm), maximum fresh weight of tuberous roots ha^{-1} (23.67 t ha^{-1}) and maximum dry weight of tuberous roots ha^{-1} (2.01 t ha^{-1}). The least values were reported from control (T_{10}).

This might have been possible by better absorption of potassium from the soil in treatments that received both organic and inorganic nutrition (Sathiyaraj, 2017). As coleus is a rhizomatous crop, improvement of soil physical environment might have helped in better development of tubers (Sandhya *et al*., 2009). It leads to increased the yield

parameters *viz.*, number of tuberous roots plant^{-1}, length, and girth of tuberous roots. The similar findings were reported by Ravikumar *et al*. (2013) and Tanuja *et al*. (2013) in medicinal coleus, Aruw *et al*. (2012) in senna, Ashashri *et al*. (2013) in ashwagandha.

The maximum fresh and dry weight of roots due to humic substances present in farmyard manure which could have mobilized the reserve food materials to the sink through increased activity of hydrolysing and oxidizing enzymes. This combined application would have helped in better availability and utilization of nutrients. All these scavenging effects might have made quick mobilization and availability of nutrients, which would have aided in increased plant growth and improved the fresh and dry tuber yield (Sathiyaraj, 2017). The increase in yield is mainly related to the positive correlation between yield contributing characters and better vegetative growth of plants. These characters were greatly influenced by the balanced nutrition and their availability. This facilitates better accumulation of photosynthates consequently increased the yield. All these factors could ultimately result in a higher yield in this particular treatment (Ravikumar *et al*., 2013). The similar findings of maximum yield parameters were reported by Sadashiv nadukeri *et al*. (2014) in medicinal coleus, Sandya Rani *et al*. (2009) in medicinal coleus, Pratibha *et al*. (2010) in senna, Vembu *et al*. (2010) in periwinkle, Saravaiya *et al*. (2011) in dioscorea, Chaturvedi *et al*. (2016) in kalmegh.

Conclusion

Based on the observation obtained from these research, it could be concluded that the plants treated with T_5 (75 % RDF + FYM @ 15 t ha^{-1} + Castor cake @ 2 t ha^{-1} + Azotobacter @10 kg ha^{-1}) recorded the maximum yield parameters in medicinal coleus. The combined use of inorganic fertilizers, organic fertilizers, and bio-fertilizers recorded maximum tuberous root yield in medicinal Coleus. This is achieved by proper nutrient management that is sustainable involves maximizing production, preventing on-site soil degradation, and minimizing off-site involvement of applied nutrients.

Table 1 : Effect of integrated nutrient management on number of tuberous roots plant^{-1}, root length, root girth, fresh and dry weight of tuberous roots ha^{-1} in medicinal coleus (*Coleus forskohlii* Briq.)

TREATMENTS	Number of tuberous roots plant^{-1} (150 DAP)	Root length (cm) (150 DAP)	Root girth (cm) (150 DAP)	Fresh weight of tuberous roots t ha^{-1} (150 DAP)	Dry weight of tuberous roots t ha^{-1} (150 DAP)
T_1 -100 % RDF + FYM @ 15 t ha^{-1}	8.55	14.22	1.179	6.28	0.63
T_2 - 75 % RDF + FYM @ 15 t ha^{-1} + Neem cake @ 1 t ha^{-1} + Azospirillum @ 10 kg ha^{-1}	11.51	17.66	1.315	8.41	1.14
T_3 - 75 % RDF + FYM @ 15 t ha^{-1} + Neem cake @ 2 t ha^{-1} + Azospirillum @ 10 kg ha^{-1}	12.29	19.67	1.373	9.36	1.42
T_4 -75 % RDF + FYM @ 15 t ha^{-1} + Castor cake @ 1 t ha^{-1} + Azotobacter @ 10 kg ha^{-1}	14.23	21.47	1.452	10.47	1.69
T_5 - 75 % RDF + FYM @ 15 t ha^{-1} + Castor cake @ 2 t ha^{-1} + Azotobacter @ 10 kg ha^{-1}	16.23	22.99	1.520	11.67	2.01
T_6 - 50 % RDF + FYM @ 15 t ha^{-1} + Neem cake @ 1 t ha^{-1} + Azospirillum @ 10 kg ha^{-1}	9.44	16.21	1.237	7.26	0.88
T_7 - 50 % RDF + FYM @ 15 t ha^{-1} + Castor cake @ 1 t ha^{-1} + Azotobacter @ 10 kg ha^{-1}	12.51	20.12	1.393	9.55	1.43
T_8 - 50 % RDF + FYM @ 15 t ha^{-1} + Neem cake @ 2 t ha^{-1} + Azospirillum @ 10 kg ha^{-1}	11.12	17.22	1.295	8.19	1.13
T_9 -50 % RDF + FYM @ 15 t ha^{-1} + Castor cake @ 2 t ha^{-1} + Azotobacter @ 10 kg ha^{-1}	14.50	21.90	1.462	10.73	1.75
T_{10} – Control	7.79	12.86	1.150	5.35	0.35
S. Ed	**0.246**	**0.384**	**0.026**	**0.185**	**0.03**
CD (P = 0.05)	**0.517**	**0.807**	**0.054**	**0.39**	**0.063**

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