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EFFECT OF INTEGRATED NUTRIENT MANAGEMENT ON VEGETATIVE GROWTH OF DRAGON FRUIT (*HYLOCEREUS POLYRHIZUS (WEB.)* BRITTON AND ROSE)

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ABSTRACT

The present investigation entitled that "Effect of integrated nutrient management on growth, flowering, yield and quality of dragon fruit [*Hylocereus polyrhizus* (web.) Britton and Rose]" was carried out during year of 2023-24. The experiment was laid out in a Randomized Block Design (RBD) consisting of twelve treatments T_1 Control, T_2 Azotobacter, T_3 PSB, T_4 NPK(75%) + Azotobacter, T_5 NPK(75 %) + PSB, T_6 NPK (75%) + Azotobacter + PSB, T_7 NPK (50%) + Azotobacter, T_8 NPK (50%) + PSB, T_9 NPK (50%) + Azotobacter + PSB, T_{10} NPK (25%) + Azotobacter, T_{11} NPK (25%)+PSB, T_{12} NPK (25%) + Azotobacter + PSB and replicated thrice. The vegetative growth parameters of dragon fruit plant significantly influenced by integrated nutrient management .The data revealed that maximum plant height (207.07 cm), stem diameter (12.74cm), number of stem areoles per rib (71.73), minimum number of segments per plant (4.67), number of ribs per plant (1.67), number of spines per areoles (2.31), number of branches per plant (6.67) was recorded with the application of NPK(75%)+ Azotobacter +PSB under T_6 treatment. Among these almost number of vegetative parameters were found to be non-significant. While, the minimum values were recorded in the treatment T_1 control.

Keyword **:** Dragon fruit, INM, Azotobacter, PSB, Vegetative Growth

Introduction

The dragon fruit (*Hylocereus spp.*) is a herbaceous perennial climbing and night blooming cactus plant that possesses chromosomal number 2n=22 and is a member of the cactaceae family. It is originated in tropical and sub-tropical forest regions of Mexico, Central and South America where they are called as pitaya. This exotic fruit crop is a recently introduced to India and one of the high value premium fruit crops in India and it is gaining popularity with each passing day. It is also known as Kamalam (State fruit of Gujrat), *Cereus triangularis*, Jesus in the cradle, Pitaya, Strawberry Pear, Night Blooming Cereus, Queen of Night, Honorable Queen, and Belle of the Night (Martin *et al.*, 1987). Dragon fruit has been recognized worldwide as a fruit and ornamental plant. This is a fast-growing perennial vine that requires vertical support to grow. The stem is a succulent plant with many branching nodes. Each segment has three to five wavy wings with one to three spines or no spines. The aerial roots of the dragon fruit stem cling to the support, helping the tree fly up and stand upright. Small, soft black seeds are scattered throughout the white and red flesh of the fruit that is to be eaten. The fruit is round to oval, with red or yellow skin with green scales. There are 4 species of dragon fruit: *Hylocereus undatus* that has red skin and white flesh, *Hylocereus polyrhizus* that has red skin and red flesh, *Hylocereus costaricensis* that has red skin with purple-red flesh and *Selinecereus megalanthus* has yellow skin with white flesh (Mirzahi and Nerd, 1999). The fresh dragon fruit has a moisture content of 83.5–88.00%, 0.16–0.23 g of protein, 0.21–0.61 g of fat, and 0.70–0.90 g of fibre. In addition, 6.30 to 8.80 mg of calcium, 30.20 to 36.10 mg of phosphorous, 0.50 to 0.65 mg of iron, and 8.00 to 9.00 mg of vitamin C are

present in 100g of fresh fruit pulp. In addition, red-fleshed fruits have a pigment called betacyanin that can be found in as much as 200 mg of fruit per 100g (Tripathi *et al.,* 2016). Furthermore, adequate nitrogen management is required to ensure improved productivity and quality during the extended fruiting season (June–October) because to the high crop load and high sink potential (Weiss, Raveh, and Mizrahi 2009; Kishore 2016). Potassium is sometimes referred to as the "quality element" for crop production (Usherwood, 1985) and numerous crop quality measures have shown potassium to be critically important. An adequate supply of K has a considerable impact on fruit size, appearance, colour, soluble solids, acidity, vitamin content, flavourand shelf life.

Materials and Methods

The present investigation entitled that "Effect of integrated nutrient management on growth, flowering, yield and quality of dragon fruit [*Hylocereus polyrhizus* (web.) Britton and Rose]" was carried out during year of 2023-24 at the Botanical garden of BBAU. The experiment was laid out in a Randomized Block Design (RBD) consisting of twelve treatments T1 Control, T2 Azotobacter, T3 PSB, T4 NPK (75%) + Azotobacter, T5 NPK (75 %) + PSB, T6 NPK(75%) + Azotobacter + PSB, T7 NPK (50%) + Azotobacter, T8 NPK (50%) + PSB, T9 NPK (50%) + Azotobacter + PSB, T10 NPK (25%) + Azotobacter, T11 NPK (25%)+PSB, T12 NPK (25%) + Azotobacter + PSB and replicated thrice. Measurements were taken for Plant height (cm), Stem diameter (cm), Number of stem areoles per rib, Number of ribs per branches, Number of segments per plant, Number of spines per areole, Number of branches per plant. The collected data underwent statistical analysis. Plant height (cm) was measured with the help of pole and measuring tape. The height of the plant in each treatment was recorded from ground level to the tip of the main shoot and expressed in centimeter (cm). Stem diameter (cm) of the main stem from 50 cm above the base of the plant was considered as initial point and was measured using Vernier calipers and expressed in centimeter (cm). Number of stem areoles per rib each plant's stem areoles per rib were counted and expressed in number. Number of ribs per branches each branch of ribs/lobes was counted and expressed in number. Number of segments per plant the number of segments was recorded in each plant and expressed in number. Number of spines per areole the number of spines was recorded in each areole per plant and expressed in number. Number of branches per plant the number of branches/ shoots were counted and expressed in number.

Results and Discussion

The results revealed that maximum plant height was recorded (207.07cm) in the treatment T_6-NPK (75%) + Azotobacter + PSB followed by T5 (189.68cm), and T8 (196.53 cm) which were also statistically at par with each other. The minimum plant height was recorded in the treatment T_1control (143.07cm). This may be due to the availability of nutrients around the plants throughout the period of growth, which is a source of nutrients, might have resulted in recording the higher values of plant height. Tamanna Perween and Hasan (2019) reported maximum length of cladodes with maximum dose of NPK fertilizer in dragon fruits. Maximum stem diameter was recorded (12.74cm) in the treatment T_6-NPK(75%)+ PSB+ Azotobacter which were found at par with T_5 (10.53cm) and T_7(10.43 cm). However, minimum stem diameter was found in T_1control (8.83 cm).This increase in the stem diameter may be because, the application of fertilizers increased soil fertility. This is turn led to high protein and carbohydrate synthesis and elongation of cells inside the plant. These observations are in line with the report of Singh *et al.* (2010) in Strawberry. Number of stem areoles per rib was recorded (71.73) maximum in the treatment T_6- NPK (75%) + Azotobacter + PSB followed by T7 (68.37), T8 (64.90) while, least stem areoles were found in the treatment T_1control (52.07). The cactus areole, the area on the stem that usually produces flowers and spines, is well pronounced in peyote, and is identified by a tuft of hairs or trichomes. They may also be an accumulation of carbonates and oxalates. Numbers of segments per plants significantly influenced by integrated nutrient management. Minimum number of segments per plants was recorded 4.67) in the treatment T_6- NPK (75%)+ Azotobacter + PSB while, maximum segments were found with T_1(8.00). This may be due to the genetical characters of dragon fruit and effect of integrated nutrient management which tend the fast growth and suppress the number of segments. Number of ribs per plants was not significantly influenced by the integrated nutrient management there was no significant variation found among the treatments with respect to number of ribs per plants. The maximum value (4.68) wasobserved in the treatment T_6 NPK (75%)+ Azotobacter + PSB. However, minimum ribs obtained (1.67) T_1(control). This may be genetical characters of dragon fruit. Some cactus epiphytes in nature exhibit two, three, and four ribs on a single individual, and there are commonly differences in stem morphology from juvenile versus adult types. Number of branches per plants was significantly influenced by integrated nutrient

management results revealed that maximum number of branches per plants was found (16.67) with T_6- NPK (75%)+Azotobacter+ PSB which were significantly at par with T5 (14.67). However, least branches were found (6.67) with T_1control. The increments in number of branches may be due to the increases in plant height as nitrogen application rates increased. Nerd *et al.* (2002) similar findings noted that the addition of nitrogen increased number of branches in marigold. The number of spines per areoles was not significantly influenced by the application of integrated nutrient management results revealed that non-significant variation found among the treatments with respect to number of spines per areoles whereas maximum value (4.33) was observed in the treatment T_6– NPK (75%) + Azotobacter + PSB (3.81) however, minimum spines were obtained (2.31) in the treatment T_1. Most species of cacti have lost true leaves, having only spines, which are highly modified leaves, as well as defending against herbivores. Spines help prevent water loss by reducing airflow close to the cactus. In the absence of leaves, enlarged stems carry out photosynthesis.

Conclusion

The results of study with data reveal our routes towards prescribed integrated nutrient management. Among all the treatments, T_6 with the application of NPK (75%)+ Azotobacter +PSB was best in respect with vegetative growth of dragon fruit. Based on these results, growers of dragon fruit in North India are advised to use NPK (75%)+ Azotobacter + PSB for increased growth of plant.

Table 1: Effect of integrated nutrient management on vegetative growth of dragon fruit (*Hylocereus polyrhizus(web.)* Britton and Rose)

Treatments	Plant height (cm)	Stem diameter (cm)	Number of stem areoles per rib	Number of segments per plants	Number of ribs per plants	Number of branches per plants	Number of spines per areoles
T_1-Control	143.07	8.83	52.07	8.00	1.67	6.67	2.31
T_2-Azotobacter	163.23	9.50	54.27	7.33	3.00	7.67	3.67
T_3-PSB	151.93	9.47	53.27	6.00	3.33	7.00	3.33
T_4-NPK(75%)+ Azotobacter	171.50	10.40	61.53	6.33	2.67	12.33	4.00
T_5- NPK(75%)+ PSB	200.77	10.53	61.13	6.67	3.00	14.67	4.12
T_6-NPK(75%)+Azotobacter+PSB	207.07	12.74	71.73	4.67	4.68	16.67	4.33
T_7-NPK(50%)+ Azotobacter	169.37	10.43	68.37	6.33	3.33	11.00	2.33
T_8- NPK(50%)+PSB	196.53	10.34	64.90	5.33	3.67	11.33	2.67
T_9-NPK(50%)+Azotobacter+PSB	189.57	9.77	62.50	7.33	4.00	9.00	3.00
T_{10}-NPK(25%)+ Azotobacter	182.73	8.56	61.33	7.00	4.33	8.67	3.10
T_{11}- NPK(25%)+PSB	152.00	7.31	59.60	7.00	4.00	9.00	2.33
T_{12}-NPK(25%)+Azotobacter+PSB	155.00	12.20	64.17	7.67	2.33	9.00	2.67
C.D.	10.28	1.32	3.69	1.80	1.28	1.95	1.10
SE(m)	3.58	0.46	1.28	0.63	0.45	0.68	0.38

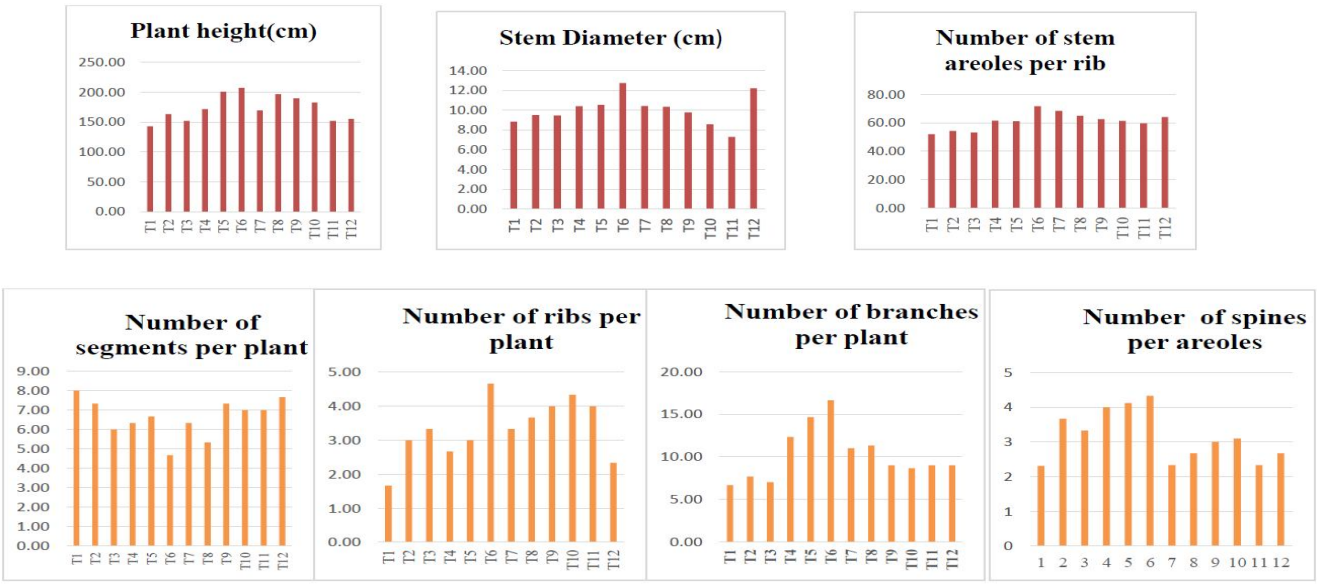

Fig. 1: Effect of integrated nutrient management on vegetative growth of dragon fruit (*Hylocereus polyrhizus (web.)* Britton and Rose)

Plate 1 : A general view dragon fruit plants

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