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# Evaluation of efficacy of Organic Plant growth promoter – IMPEL on growth and yield of Chilli (*Capsicum annum L.*)

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**ABSTRACT:** Organic growth promoters are increasingly important in chemical agriculture as they offer a sustainable approach to enhance crop growth improving soil health and reducing reliance on synthetic fertilizers and pesticides. They enhance nutrient uptake, improve plant resistance to stress that leads to healthier plants and increased yield. The present field experiment was conducted during October 2024 Rabi season in a farmer's field at Alwal, Secunderabad to evaluate the efficacy of Organic Plant growth promoter – IMPEL on growth and yield of Chilli. The experiment was laid out in the Randomized Block Design (RBD) and the treatments comprised of “T1- IMPEL @ 1 ml/lit, T2- IMPEL @ 2 ml/lit, T3- IMPEL @ 3 ml/lit, T4- Sea weed extract @ 1 ml/lit, T5- Sea weed extract @ 2 ml/lit, T6- Sea weed extract @ 3 ml/lit, T7-Rec. N-P-K, T8-control. N-P-K nutrients were applied @ 100-60-40 Kg/ha. Organic Growth Promoter IMPEL and Seaweed extract (SWE) were applied as foliar spray at pre-flowering and fruit setting stages to all the treatmental plots except control. From the results of the experiment, it was observed that all the growth parameters i.e., plant height, number of branches and number of leaves per plant were increased significantly by the application of IMPEL and sea weed extract (SWE) along with recommended N-P-K compared to control, Among the treatments IMPEL @ 3 ml/L application as foliar spray recorded the highest plant height (87 cm), branches (31) and leaves per plant (290). Lowest values observed in control plot (65 cm, 14 and 155 respectively). Number of flowers / plants (108), number of fruits / plant (88) and % fruits set (82) and fruit yield (690g) per plant were significantly increased by the application of IMPEL at all the doses. Among the treatments IMPEL @ 3 ml / L recorded the highest values for these characters. Lowest values were recorded in control (65 and 62 respectively). IMPEL @ 3ml significantly increased vitamin ‘C’ content also.

**KEYWORDS:** Organic Growth Promoters, Chilli, Growth and Yield.

## I. INTRODUCTION

Chilli (*Capsicum annum L.*) is a globally significant crop, particularly in India valued for its culinary uses, pleasant aromatic flavour, pungency, vibrant colour and medicinal properties. It is a key spice, vegetable and cash crop containing vitamins, minerals and anti-oxidants. Organic plant growth promoters (PGPs) often naturally derived, play a vital role in modern agriculture by enhancing plant growth improving crop quality and reducing reliance on synthetic fertilizers and pesticides. Due to indiscriminate application of chemical fertilizers resulted in serious reduction in soil microbial population [Devi *et.al*, 2022], leads to degradation in soil physical properties and fertility components [Selim, 2021]. Balanced application of N-P-K nutrients can increase the growth, development and yield of chilli [Aslam Zubair *et.al*, 2022]. Exogenous application of plant growth regulators (PGRs) however, manipulate the growth regulation of any crop. In the recent past, the bio-stimulants are being used for crop regulation for their more efficient synergistic and complementary effect, replacing the PGRs [Dhanasekaran and Bhuvaneshwari, 2005]. The high yielding varieties with big size and the attractive colour are of good market preference [Perez-Caselles *et. al*, 2020]. With this backdrop, the present field experiment was conducted to study the effect of IMPEL, a bio stimulant, on the growth, yield and quality of Chilli.



## II. MATERIALS AND METHODS

The present field experiment was conducted at a farmer’s field, Alwal, Secunderabad (TS) during October 2024 Rabi season. The experimental field was even with good irrigation and drainage facility. The experimental soil was red sandy loam texture, with medium organic carbon (0.7%), slightly alkaline pH (7.5). Available Nitrogen and Phosphorous are medium with high available Potassium. The experiment was laid out in Randomized Block Design (RBD) with 8 treatments with three replications. with plot size of 3x3 m (9.0 m<sup>2</sup>). The Chilli cv. LCA-235 seedlings of one month old were collected from Centre of Excellence, Dept of Horticulture, Jeedimetla, Secunderabad. The seedlings were transplanted in the well-prepared field at a spacing of 60 x 45 cm by ridge and furrow method. Farm yard manure was applied @ 15 t/ha as soil application at last ploughing. Recommended N-P-K nutrients were applied @ 100-60-40 kg/ha to all the treatments except control. Nitrogen was applied in two split doses, i.e., half as basal and the remaining as top dressing. Entire dose of Phosphorous and Potassium were applied as basal. Irrigation was given at different stages of crop as per the requirement. Inter cultivation, weeding, and timely prophylactic measures were taken up. The organic Growth Promoter – IMPEL, prepared by Cereal Protein Hydrolysis method, was manufactured and supplied by M/S Sowbhagya Biotech Pvt. Ltd. Secunderabad. The Sea Weed Extract (SWE) supplied was prepared from *Sargassum* species. The organic growth promoter- IMPEL (Cereal Protein Hydrolysate) and Sea Weed Extract (SWE) were applied as foliar spray at pre-flowering, flowering and fruit-setting stages. The treatments of this trial comprised of T1- IMPEL @ 1 ml/L, T2- IMPEL @ 2 ml/L, T3- IMPEL @ 3 ml/L, T4- Sea weed extract @ 1 ml/L, T5- Sea weed extract @ 2 ml/L, T6- Sea weed extract @ 3 ml/Lt, T7-Recommended dose of N-P-K, T8-control. The biometrical parameters viz, plant height, number of branches per plant, number of leaves, number of flowers per plant recorded at maximum growth stage of the crop. The yield parameters viz, number of fruits per plant, fruit weight (g), fruit length (cm), yield / plant (g).and yield / plot (Kg) were recorded. The vitamin-C content in Chilli fruits was estimated using 2,6-dichlorophenol Indophenol titration method and expressed as mg/100g [Sadasivam and Manickam]. The statistical analysis was done as per the procedure charted [Panse and Sukhatme 1985].

## III. RESULTS AND DISCUSSION

### Growth Parameters

The growth parameters i.e. plant height, number of branches and number of leaves per plant was increased significantly by the application of IMPEL and Sea Weed Extract (SWE) along with recommended N-P-K compared to control (Tab-1). Among the treatments IMPEL @ 3 ml/L application as foliar spray recorded the highest plant height (87 cm), branches (31) and leaves per plant (290) compared to other treatments the lowest values observed in control plot (65 cm, 16 and 170 respectively). Similar trend was observed where the Number of flowers / plant was maximum (108) with IMPEL @ 3 ml/L compared to other treatments and lowest was observed in control (68). The increase in growth with application of IMPEL was due to the enhanced cell division, cell expansion as the N-P-K nutrients play important role in cell division and multiplication which ultimately results in maximum vegetative growth (Anbukkarasi *et al*, 2018). The significant increase in flower production is due to combined application of inorganic nutrients and growth promoting substances which has led to the production of auxins and their translocation towards reproductive growth promoting flower production [Netam and Sharma, 2014].

Table1. Effect of Organic Growth Promoter – IMPEL on growth parameters and flowering in chilli

Treatment	Plant ht (cm)	No. of branches /plant	No. of leaves /plant	No. of flowers /plant
T1- IMPEL @ 1 ml/lit	80	25	270	92
T2- IMPEL @ 2 ml/lit	84	28	281	100
T3- IMPEL @ 3 ml/lit	<b>87</b>	<b>31</b>	<b>290</b>	<b>108</b>
T4- Sea weed extract @ 1 ml/lit	75	20	245	89



T5- Sea weed extract @ 2 ml/lit	80	25	258	93
T6- Sea weed extract @ 3 ml/lit	83	28	271	100
T7- (Rec. NPK)	70	18	190	82
T8-control	<b>65</b>	<b>14</b>	<b>155</b>	<b>68</b>
SEd	1.35	1.56	6.2	1.4
CD (p=0.05)	3.12	3.25	15.2	2.75

**Yield Parameters**

The yield parameters i.e., number of fruits / plants were significantly increased by the application of IMPEL and SWE at all the doses. Among the treatments IMPEL @ 3 ml / L recorded the highest values for these characters followed by IMPEL @ 2.0 ml / liter, 1ml/L and SWE. Lowest values were observed in control plot (Tab-2). The highest number of fruits per plant (88), average fruit weight (180 g), fruit length (14.5 cm), fruit yield / plant (690 g) and fruit yield / plot (26.8 Kg) was recorded in T3 treatment i.e., IMPEL @ 3 ml/L compared to other treatments. The lowest yield parameters were observed in control plot – T8. The increased yield components and yield could be explained that upon onset of flowering anabolic activities were increased along with redistribution of metabolites. The nitrogen which was earlier utilized by vegetative parts was translocated toward reproductive organs to form amino acids and proteins and ultimately used for increasing number of flowers, fruits and fruit weight [Vandana and Verma, 2014; Patel *et.al*, 2016]. The highest Vit. C was recorded in the treatment T3 (98.8 mg) compared to other treatments and lowest was noticed in T8 - control (88 mg).

Table2. Effect of Organic Growth Promoter – IMPEL on fruit yield and quality in chilli

Treatment	No. of Fruits /plant	Avg. Wt. of 10 fruits (g)	Fruit dia. (cm)	Fruit length (cm)	Fruit yield /plant (g)	Fruit yield /plot (Kg)	Vit-C (mg/100g)
T1- IMPEL @ 1 ml/lit	77	158	2.8	12.8	656	20.2	95.0
T2- IMPEL @ 2 ml/lit	84	165	3.0	13.7	674	24.6	96.5
T3- IMPEL @ 3 ml/lit	88	180	3.3	14.5	690	26.8	98.8
T4- Sea weed extract @ 1 ml/lit	75	148	2.4	11.5	620	20.9	94.0
T5- Sea weed extract @ 2 ml/lit	79	156	2.6	12.6	645	21.6	94.6
T6- Sea weed extract @ 3 ml/lit	83	164	2.9	13.4	672	23.5	96.7
T7- (Rec. NPK)	67	140	2.4	10.8	560	19.6	93.4
T8-control	44	122	1.6	7.5	410	14.1	88.0



SEd	2.78	2.8	0.12	0.6	5.5	0.5	0.25
CD (p=0.05)	6.2	6.4	0.26	1.5	11.5	1.35	0.66

#### IV. CONCLUSION

The growth and yield of Crops can be increased by the application of balanced levels of N-P-K nutrients. However, growth regulation of any crop is manipulated by the exogenous application of growth promoters. The synergistic effect between growth promoters and nutrients are utilized for the protein synthesis, eventually resulting in stimulated growth and yield. From the present experimental findings, it can be concluded that application of organic plant growth promoter – IMPEL along with balanced application of manures and inorganic nutrients (macro and micro) will help in increasing growth, yield and quality of Chilli and fetch remunerative price to the farmers.

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