



EFFECT OF FOLIAR APPLICATION OF DIFFERENT LIQUID ORGANICS ON GROWTH IN CUCUMBER (*CUCUMIS SATIVUS* L.) CV. LOCAL

Yuvrajsinh D. Chavda^{1*}, H. N. Leua², Vrushti S. Tandel¹ and Nayan R. Rupala¹

¹Department of Vegetable Science, College of Horticulture, S.D. Agricultural University, Jagudan, Gujarat, India.

²Department of Fruit Science, Collège of Horticulture, S.D. Agriculture University, Jagudan, Gujarat, India.

*Corresponding author E-mail: yuvrajsinhchavda30@gmail.com

ABSTRACT

The present investigation entitled Effect of foliar application of different liquid organics on growth in cucumber (*Cucumis sativus* L.) cv. Local was conducted during summer, 2023 at College Farm, College of Horticulture, Sardarkrushinagar Dantiwada Agricultural University, Jagudan, Dist. Mehsana, Gujarat. Experiment was laid out in Randomized Block Design with three replications. Total thirteen treatments were evaluated in the present study viz., Control (T₁), Panchagavya@3 % (T₂), Panchagavya@5 % (T₃), Panchagavya@7 % (T₄), Vermiwash@5 % (T₅), Vermiwash@10 % (T₆), Vermiwash@15 % (T₇), Cow urine @5 % (T₈), Cow urine @10 % (T₉), Cow urine @15 % (T₁₀), Novel organic liquid nutrient @1 % (T₁₁), Novel organic liquid nutrient @ 1.5 % (T₁₂), Novel organic liquid nutrient @2 % (T₁₃). Foliar application of liquid organics was performed at 30, 45 and 60 DAS. The results revealed that maximum length of main at last harvest (244.90 cm), number of branches per plant at last harvest (13.07), number of female flowers (20.07) and per cent fruit set (69.44 %) were observed with the treatment T₁₃ (Novel organic liquid nutrient @ 2 %). There was no significant effect on days taken for appearance of first male flower, days taken for appearance of first female flower, number of male flowers, days taken from fruit set to edible maturity and sex ratio of male and female flowers.

Key words: Cucumber, Cow urine, foliar application, liquid organics, Novel organic liquid nutrient, Panchagavya, Vermiwash.

Introduction

Vegetable growing is the most remunerative enterprise as it is adopted on small and marginal holding with high production in short duration. Being a source of farm income, it creates impact on the agricultural development and economy of the country. Cucurbitaceae is the largest family of vegetable crops, which includes approximately 125 genera and 960 species. Vegetables of the cucurbitaceae family are part of ancient medicine and culinary traditions. One of the valuable plants among them is cucumber (*Cucumis sativus* L.). It is a diploid species (2n = 14) with the basic chromosome number, x = 7. It is believed to have been originated in India. It's Sanskrit equivalent name "Urvaruka" and "Ervaruka" as mentioned in the old treatises of India "Rigveda" and "Charaka Samhita" amply justifies its cultivation dates back to 3000 years. The wild species *Cucumis sativus*

L. var. *hardwickii* (R) Alex (Syn. *Cucumis hardwickii* Royle) found along the foothills of the Himalayas is a feral or progenitor of the cultivated cucumber (*Cucumis sativus* L.). Nutritively 100 g edible portion of cucumber contains approximately 96.3 g moisture, 2.5 g carbohydrates, 0.4 g protein, 0.1 g fat, 0.4 g fibre, 0.3 g minerals, 10 mg calcium, 25 mg phosphorous, and traces of vitamin C, thiamine, niacin and iron. (Choubey *et al.*, 2023).

In Sanskrit, *panchagavya* means the blend of five products obtained from cow namely dung, urine, milk, curd and ghee. Effective microorganisms (EMOs) in *panchagavya* are the mixed culture of naturally occurring beneficial microbes mostly lactic acid bacteria (*Lactobacillus*), yeast (*Saccharomyces*), photosynthetic bacteria (*Rhodospirillum rubrum*) and certain fungi (*Aspergillus*). Certain beneficial biofertilizers *i.e.*

acetobacter, *azospirillum* and *phosphobacterium* are reported in *panchagavya* which have the beneficial effect especially in improving soil quality, growth and yield of crops (Ram, 2017). Biochemical properties of *panchagavya* revealed that it possesses almost all the major nutrients like N, P₂O₅, K₂O and micronutrients essential for plant and growth hormones like IAA and GA₃ required for crop growth (Selvaraj *et al.*, 2007).

Vermiwash is a honey brown coloured liquid extract of organic composts, generally the wash of earthworms presents in the medium collected after the passage of water through the different layers of worm culture unit (Jayabhaye and Bhalerao, 2015). It is used as foliar spray. Earthworms are a major part of the vermiwash experimental unit. *Eisenia foetida* is the species of earthworms which is used for the vermiwash preparation. Vermiwash contains several enzymes, plant growth hormones (IAA, Cytokinin, GA₃), vitamins, macro and micronutrients (Bucker field *et al.*, 1999) along with excretory substances and mucus secretion of earthworms (Ansari and Sukhraj, 2010). It contains total solids (2448 mg/L), volatile solids (738 mg/L), silica (8 mg/L), auxin (0.98 µg/L) and cytokinin (0.68 µg/L) (Patil *et al.*, 2007).

Cow urine has a unique place in Ayurveda and has been described in *Sushruta Samhita* and *Astanga Sangraha* to be the most effective substance of animal origin with innumerable therapeutic values. Being organic in nature it is eco-friendly and if used in crops has no adverse effect on ecosystem and human health. Cow urine contains *i.e.* water 95 %, urea 2.5%, minerals, salt, hormones, and enzymes 2.5 %. It contains iron, calcium, phosphorus, potassium, urea, uric acid, amino acids, enzymes, cytokine and lactose *etc.* (Ramani *et al.*, 2012).

Novel organic liquid nutrient is a patented product of Navsari Agricultural University. It is obtained as a byproduct during extraction of fibre from banana pseudostem. It contains major nutrients like nitrogen (0.062 %), phosphorous (0.018 %), potassium (0.180 %), calcium (0.031 %), magnesium (0.092 %), sulphur (0.010 %) as well as micronutrients like manganese (5.73 ppm), copper (0.40 ppm), zinc (2.92 ppm), and ferrous (109.3 ppm). It contains biochemical properties *viz.*, total phenol 48.0 to 49.1 mg/100 ml, gibberellic acid 110.2 to 205.0 mg/l, and cytokinin 137.8 to 244.3 mg/l. It also contains microbes *i.e.*, PSB (1025 × 103 CFU/ml), rhizobium (285 × 102 CFU/ml), *azotobacter* (460 × 102 CFU/ml), fungal count (1200 CFU/ml) and total viable count (1065 × 103 CFU/ml) (Champaneri, 2021).

Materials and Methods

A field experiment on cucumber (cv. Local) was

conducted at College Farm, College of Horticulture, S. D. Agricultural University, Jagudan, Gujarat, India during summer 2023. Experiment was laid out in Randomized Block Design with three replications. Total thirteen treatments were evaluated in the present study *viz.*, Control (T₁), *Panchagavya*@3 % (T₂), *Panchagavya*@5 % (T₃), *Panchagavya*@7 % (T₄), Vermiwash@5 % (T₅), Vermiwash@10 % (T₆), Vermiwash@15 % (T₇), Cow urine @5 % (T₈), Cow urine @10 % (T₉), Cow urine @15 % (T₁₀), Novel organic liquid nutrient @1 % (T₁₁), Novel organic liquid nutrient @ 1.5 % (T₁₂), Novel organic liquid nutrient @2 % (T₁₃). Foliar application of liquid organics was performed at 30, 45 and 60 DAS.

The experimental soil was loamy sand, with good drainage condition. Well rotten farmyard manure was applied 15 days before sowing at the rate of 20 tons per hectare. Half dose of N and full dose of P₂O₅ and K₂O were applied as basal application at the time of sowing. The remaining half dose of nitrogen was applied as top dressing at 30 days after sowing. Uniform dose of nitrogen in the form of urea, phosphorus in the form of single super phosphate and potash in the form of muriate of potash was applied at the rate of 50:25:25 kg/ha. The crop was grown on a raised bed planting system. Raised bed was prepared 10 to 15 cm above the ground level. In between two rows, a space of 50 cm was left. Inter row spacing of 1.25 m and intra row spacing of 0.75 m was maintained. For irrigation, drip irrigation system was employed, one dripper of 4 lph discharge was provided for each plant. Foliar application of each treatment was given at 30, 45 and 60 days after sowing during the morning hours. Both the surface of leaves and apical meristems were fully moistened. Spraying was done with plastic hand sprayer. Observations on the different growth characters *viz.*, length of main vine at last harvest (cm), number of branches per plant at last harvest, days taken for appearance of first male flower, days taken for appearance of first female flower, number of male flowers, number of female flowers, days taken from fruit set to edible maturity, sex ratio of male and female flowers and per cent fruit set were analysed to evaluate the effect of different treatments.

Results and Discussion

Days Taken for Appearance of First Male Flower

The results revealed that the effect of the different liquid organics on days taken for appearance of first male flower was statistically non-significant. Though, minimum days (36.80) for appearance of first male flower was observed with the treatment T₁₃ (Novel organic liquid

Table 1: Effect of different liquid organics on growth of cucumber (*Cucumis sativus* L.) cv. Local.

| Tr No | Treatment details | Length of main vine at last harvest (cm) | Number of branches per plant at last harvest | Days taken for appearance of first male flower | Days taken for appearance of first female flower | Number of male flowers | Number of female flowers | Days taken from fruit set to edible maturity | Sex ratio of male and female flowers | Percent fruit set |
|-----------------|------------------------------------|------------------------------------------|----------------------------------------------|------------------------------------------------|--------------------------------------------------|------------------------|--------------------------|----------------------------------------------|--------------------------------------|-------------------|
| T ₁ | Control | 195.72 | 9.87 | 41.13 | 48.47 | 142.60 | 16.13 | 7.93 | 8.84 | 59.09 |
| T ₂ | Panchagavya@3 % | 205.30 | 10.13 | 40.33 | 47.67 | 141.33 | 17.20 | 7.87 | 8.22 | 59.30 |
| T ₃ | Panchagavya@5 % | 215.77 | 10.80 | 39.73 | 46.60 | 139.80 | 17.47 | 7.73 | 8.00 | 64.50 |
| T ₄ | Panchagavya@7 % | 234.09 | 12.33 | 38.80 | 45.40 | 135.00 | 19.07 | 7.40 | 7.08 | 68.53 |
| T ₅ | Vermiwash@ 5 % | 207.21 | 10.93 | 41.07 | 48.13 | 141.73 | 17.73 | 7.60 | 7.99 | 59.79 |
| T ₆ | Vermiwash@ 10 % | 214.32 | 11.47 | 40.73 | 47.47 | 140.20 | 18.00 | 7.13 | 7.79 | 61.16 |
| T ₇ | Vermiwash@ 15 % | 230.01 | 12.07 | 40.07 | 46.40 | 136.33 | 18.93 | 7.20 | 7.20 | 67.25 |
| T ₈ | Cowurine@5 % | 203.07 | 10.60 | 41.33 | 47.67 | 139.40 | 17.87 | 7.73 | 7.80 | 59.46 |
| T ₉ | Cowurine@ 10 % | 214.62 | 11.27 | 41.13 | 47.13 | 139.07 | 18.07 | 7.33 | 7.70 | 60.26 |
| T ₁₀ | Cowurine@ 15 % | 220.89 | 11.60 | 40.87 | 46.53 | 138.53 | 18.13 | 7.27 | 7.64 | 62.32 |
| T ₁₁ | Novelorganicliquid-nutrient@ 1 % | 216.34 | 11.40 | 40.47 | 46.80 | 136.53 | 17.93 | 7.60 | 7.61 | 59.77 |
| T ₁₂ | Novelorganicliquid-nutrient@ 1.5 % | 222.84 | 11.80 | 38.47 | 44.13 | 135.07 | 18.27 | 7.40 | 7.39 | 66.06 |
| T ₁₃ | Novelorganicliquid-nutrient@ 2 % | 244.90 | 13.07 | 36.80 | 43.80 | 134.33 | 20.07 | 6.93 | 6.69 | 69.44 |
| | S.Em. ± | 8.99 | 0.53 | 1.20 | 1.05 | 3.94 | 0.64 | 0.30 | 0.44 | 2.23 |
| | C.D.(P= 0.05) | 26.25 | 1.53 | NS | NS | NS | 1.87 | NS | NS | 6.51 |
| | C.V.% | 7.17 | 8.02 | 5.20 | 3.89 | 4.93 | 6.16 | 7.05 | 9.86 | 6.15 |

nutrient @ 2 %).

Days Taken for Appearance of First Female Flower

The results revealed that the effect of the different liquid organics on days taken for appearance of first female flower was statistically non-significant. Though, minimum days (43.80) for appearance of first female flower was observed with treatment T₁₃ (Novel organic liquid nutrient @ 2 %) which shows earliness.

Number of Male Flowers

The data resulted that number of male flowers were found not significant. However, the maximum number of male flowers (142.60) was achieved in the treatment T₁ (Control). Whereas the minimum number of male flowers (134.33) was achieved in the treatment T₁₃ (Novel organic liquid nutrient @ 2 %).

Number of Female Flowers

The statistical comparison showed the significant influence of different treatments on this character during cropping period. The data indicate that the number of female flowers varied from 16.13 to 20.07. However, the maximum number of female flowers (20.07) were achieved in the treatment T₁₃ (Novel organic liquid nutrient @ 2 %). Novel organic liquid nutrient contains total phenol 48.0 to 49.1 mg/100 ml, gibberellic acid 110.2

to 205.0 mg/l, cytokinin 137.8 to 244.3 mg/l. (Champaneri, 2021). Increase in number of female flowers might be due to the exogenous application of plant growth regulator like GA₃ from novel organic liquid nutrient (GA₃ at low concentration (4.0 ppm) which can alter the sexual differentiation in floral buds. Plant growth regulators changed the direction of sexual differentiation in potentially male buds to female buds. (Rahman *et al.* 2020). Similar results were obtained by Bajaj *et al.* (2022) in cucumber.

Days Taken from Fruit Set to Edible Maturity

The results revealed that the effect of the different liquid organics on days taken from fruit set to edible maturity was statistically non-significant. Though, minimum days (6.93) for days taken from fruit set to edible maturity was observed with the treatment T₁₃ (Novel organic liquid nutrient @ 2 %).

Sex Ratio of Male and Female Flowers

The results revealed that the effect of different liquid organics on per cent fruit set was statistically significant. The highest fruit set percentage (69.44 %) was observed with the treatment T₁₃ (Novelorganic liquidnutrient @ 2 %). The resultsrevealed that the effect of the different liquid organics on sex ratio of male and female flower

was statistically non significant. Though, lowest sex ratio (6.69) was achieved with treatment T₁₃ (Novel organic liquid nutrient @ 2 %), and highest sex ratio (8.84) was achieved in the treatment T₁ (Control).

Per cent Fruit Set

The results revealed that the effect of different liquid organics on per cent fruit set was statistically significant. The highest fruit set percentage (69.44 %) was observed with the treatment T₁₃ (Novel organic liquid nutrient @ 2 %). Increases in per cent fruit set might be due to presence of micronutrients in novel organic liquid nutrients which are directly involved in various physiological processes and enzymatic activities resulting into better photosynthesis, greater accumulation of starch in fruits and involvement of Zn in auxin synthesis. The balance of auxin in plant increased the fruit setting of the plants. (Christian *et al.*, 2021). This result was consistent with those of Patel *et al.*, (2018) in the case of mango.

Conclusions

From the foregoing discussion, it could be concluded that foliar application of Novel Organic Liquid Nutrient @ 2% at 30, 45 and 60 DAS is beneficial for obtaining maximum growth in cucumber.

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