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Research Article

Role of indigenous attractants in enhancing quantitative parameters of cucumber (*Cucumis sativus* L.)

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Abstract

Cucumber is one of the essential summer vegetable crop grown among cucurbits and highly dependent upon diverse insect pollinators for efficient pollination and production of good quality fruits. Seven treatments *viz*., Jaggery solution (10%), Sugar syrup (10%), Molasses (10%), Sugarcane juice (10%), fish waste, Untreated control and water as negative control were applied during the experiment. The attributes that contribute maximum in terms of yield such as number of fruits/plant (8.87 ± 0.14). fruit length (26.02 ± 0.47 cm), fruit diameter (5.77 ± 0.02 cm), fruit weight (350.27 ± 0.09 g), Number of seeds/fruit (453.07 ± 4.98), yield/ha (222.50 ± 4.78 q) and fruit set (69.74 ± 0.62 %) was recorded with Jaggery solution (10%) followed by sugar syrup (10%) with number of fruits/plant as 8.87 ± 0.14, fruit length 25.07 ± 0.18 cm, fruit diameter 5.60 ± 0.04 cm, fruit weight 0.321 ± 0.01 kg, number of seeds/fruit 423.65 ± 1.97, yield/ha 190.00 ± 0.16 q and fruit set as 62.38 ± 0.68 %, followed by molasses (10 %), sugarcane juice (10%) and fish waste respectively. Compared to the control, each treatment was found significantly superior. The plants which were kept untreated failed to produce fruits with highest yield attributing characters thus, signifying the importance of attractants in enhancing production of cucumber.

Keywords attractants, cucumber, jaggery solution, pollination, yield

Introduction

Cucurbits are a large and important group of vegetables that are widely grown in India. Family Cucurbitaceae includes a wide range of creeping vine crop species, including, watermelon pumpkin, muskmelon, cucumber, bitter gourd chow-chow, ash gourd, and others. Cucumber, *Cucumis sativus* L. (Family: Cucurbitaceae), among 20 cucurbits grown in India is one of the oldest vegetables grown worldwide in tropical as well as in subtropical regions of the world. Cucumber in Kashmir, is generally referred as "Laerr" and is native of Asia and Africa. Cucumber is a substantial summer vegetable crop, commonly grown for its tender fruits, which are preferably consumed as salad and pickles [1]. The cucumber is a source of thiamine, niacin, iron, calcium, vitamin C and dietary fibre [2]. Cucumber is grown in India on a area of 4.4ha and production of 68.5 t/ha. [3]. In Jammu and Kashmir, the data was recorded at 64.508 t/ha in 2017. Cucumber is produced around the world with the India being the 2nd largest producer, after china. Considering the significance of cucumber as a commercial crop, high yields of fruit with good quality are essential to their economic success. Several factors affect the yield and quality of the cucumber crop. Successful pollination is among the most crucial factors to take into account. Proper pollination usually results in perfectly and

uniformly formed fruits with even maturity [4]. In cucumber pollination is mainly done by the insects belonging to order Hymenoptera, Diptera and other insect orders. The insufficient pollination in cucumber, however, leads to a lower yield, intermittent crop failure, and crop of poor quality. Therefore, various kinds of attractants have been employed to enhance insect visits to the crop, which would be highly advantageous economically to reap the benefits of cross-pollination. Several attractants namely, sugarcane syrup, jaggery, beeline bee scent, bee-Q and molasses are being used to boost the yield of cucumber in United States Canada and Spain. However, in this context the related studies on use of attractant in India are scanty. In this regard, studies on effect of different attractants were studied to determine the role of attractants in cucumber during flowering stage to promote pollination for improving the quantitative parameters.

Methodology

The study on role of Different Attractants on Cucumber (*Cucumis sativus* L.) was carried out in the field, 2021 at the Faculty of Agriculture, Division of Entomology, SKUAST-K Wadura, which is situated between 34 '20' north latitude and 74 '24' east longitude at an elevation of 1610 metres above mean sea level. Cucumber var Japanese green long (JGL) was grown according to the set of guidelines proposed by SKUAST-K in randomized Block Design with plot size 5 x 7 m^2 and spacing of 1 x 1 m from row tow and plant to plant. One plant was taken as one replication. For this study following attractants *viz*., Jaggery solution (10%), sugar syrup (10%), molasses (10%), Sugarcane juice (10%), fish waste and water as control were used. With the beginning of 10 per cent flowering, attractants were sprayed thrice at weekly intervals. During the period of cucumber bloom, four selected fruit/plant were observed for recording the data. The appropriate statistical analysis was done on the data to make inference.

Results and Discussion

Fruit number per plant

The plants which were sprayed with jaggery solution (10%) yielded maximum number of fruits (8.87 ± 0.14 fruits) followed by sugar solution (10%), molasses (10%), sugarcane juice (10%) and fish waste which recorded 8.72 ± 0.02, 8.45 ± 1.02, 7.85 ± 0.91, and 7.52 ± 0.25 fruits respectively. However, the plants kept untreated produced least number of fruits (6.47 ± 0.25 fruits). Each treatment proved to be significantly superior over control (7.15 ± 0.15 fruits). Our findings are in correspondence with Wankhade et al. [5] who also confirmed highest number of fruits/plant (19.20 fruit/plant) due to jaggery solution (10%) (Figure 1).

Fruit length (cm)

The plants sprayed with jaggery solution (10%) recorded maximum fruit length (26.02±0.47 cm) followed by sugar syrup (10%), molasses (10%), sugarcane juice (10%) and fish waste which recorded (25.07 ± 0.20), (23.98 ± 0.70), (23.05 ± 0.29) and (21.66 ± 0.23 cm). However, Length of fruits was recorded less in plants kept untreated (19.31 ± 0.37 cm). Each treatment proved to be significantly superior over control. (20.40 ± 0.16 cm). Our findings are in correspondence with results of Mohan rao and Suryavansha [6] on watermelon (Figure 2).

Fruit diameter (cm)

The plants sprayed with jaggery solution (10%) recorded maximum diameter (5.77 ± 0.02 cm) followed by sugar syrup (10%), molasses (10%), sugarcane juice (10%) and fish waste which recorded (5.60 ± 0.04 cm), (5.45 ± 0.03 cm), (5.12 ± 0.13 cm) and (4.85 ± 0.11 cm) respectively. However, Diameter of fruits was recorded less in plants kept untreated (4.20 ± 0.21 cm). Each treatment proved to be significantly superior over control (4.52 ± 0.28). These findings are strengthened by Mussen and Thorp [7] who reported use of attractants in cucurbits results in the formation of uniformly sized fruits due to better pollination (Figure 3).

Fruit weight per plant (kg)

The plants which were sprayed with jaggery solution (10%) recorded maximum fruit weight per plant (0.350 ±0.02 kg) followed by sugar solution (10%), molasses (10%), sugarcane juice (10%) and fish

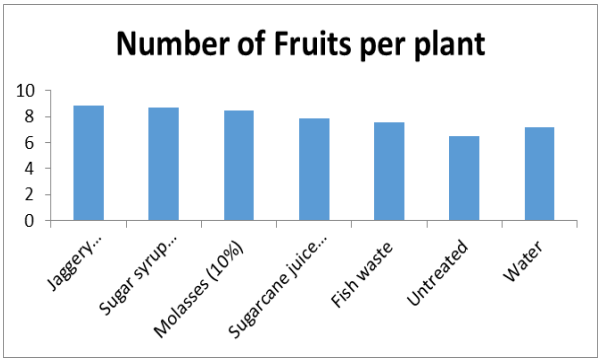

Figure 1. Effect of attractants on fruit number per plant

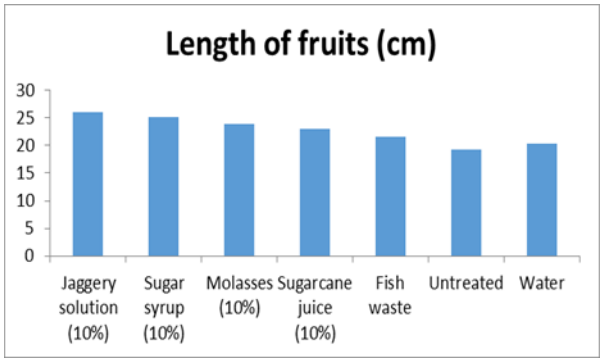

Figure 2. Effect of attractants on fruit number per plant

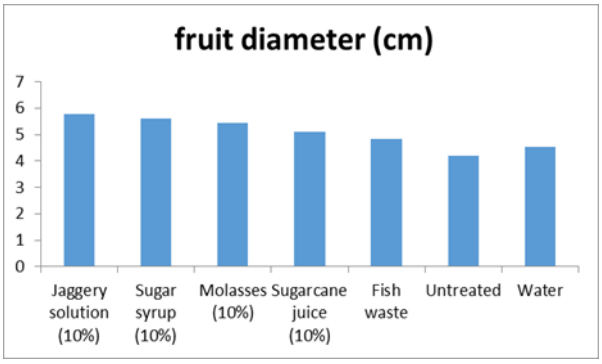

Figure 3. Effect of attractants on fruit diameter

waste which recorded (0.321 ± 0.01 kg), (0.305 ± 0.05), (0.280 ± 0.02 kg), and (0.268 ± 0.003 kg respectively). However, Weight of fruits was recorded less in plants kept untreated (0.205 ± 0.06 kg). Each treatment proved to be significantly superior over control (0.244 ± 0.02 kg). Our findings coresspond with the results of sunder [8] and rafiq [9] on cucumber (Figure 4).

Number of seeds per fruit

The plants sprayed with jaggery solution (10%) recorded highest number of seeds (453.07± 4.89 seeds/fruit) followed by sugar solution (10%), molasses (10%), sugarcane juice (10%) and fish waste which recorded (423.65 ± 1.97), (389.84 ± 14.43), (346.08 ± 2.77) and (307.96± 9.58 seeds/fruit respectively). However, number of seeds/fruits was recorded less in untreated plants (147.71 ± 7.48 seeds/fruit). Each treatment proved to be significantly superior over control (212.95 ± 6.31). Our findings are in correspondence with wankhade et al., [5] who found highest number of seeds due to jaggery solution (10%) (Figure 5).

Fruit set (%)

The plants sprayed with jaggery solution (10%) recorded maximum fruit set (69.74 ± 0.62%) followed by sugar syrup (10%), molasses (10%), sugarcane juice (10%) and fish waste which recorded (62.38 ± 0.68 %), (56.65 ±1.07 %), (49.45 ±2.64 %), and (43.23 ± 2.45 % respectively). However, less fruit set was recorded in untreated plants (33.44 ± 1.43 %). Each treatment proved to be significantly superior over control (37.85 ± 2.00 %). Our findings are confirmed with the observations of Srikanth [12] who found higher fruit set (69.74 ± 0.62 %) with an attractant citral-which is again proving the role of attractants in increasing the production in cucumber (Figure 6).

Yield per ha (q)

The plants sprayed with Jaggery solution (10%) recorded maximum yield of fruits/ha (222.50 ± 4.78 q) followed by sugar syrup (10%), molasses (10%), sugarcane juice (10%) and fish waste which recorded

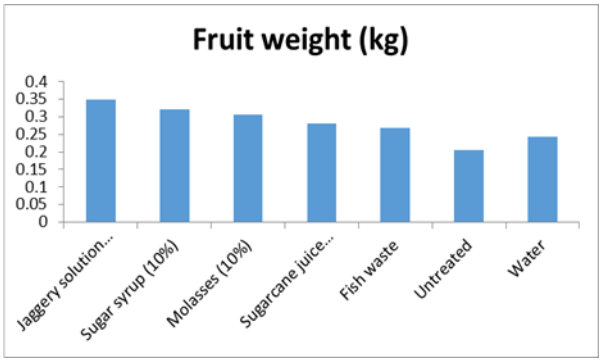

Figure 4. Effect of attractants on fruit weight

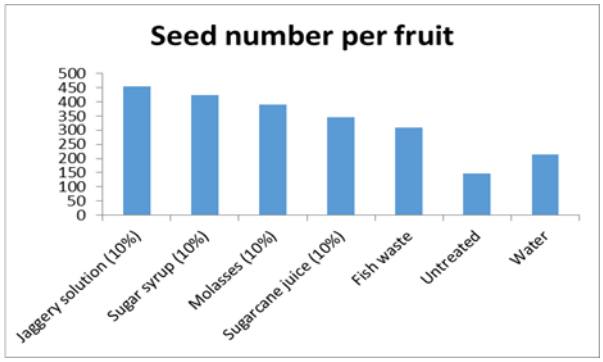

Figure 5. Effect of attractants on seed number per fruit

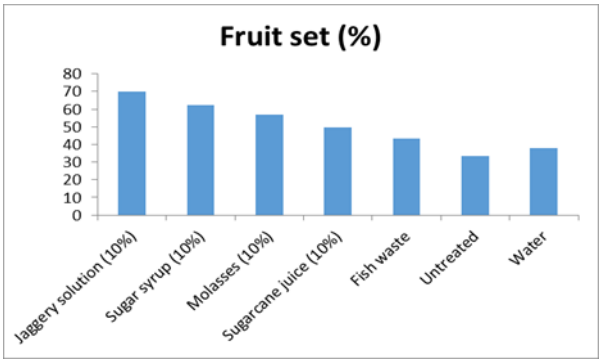

Figure 6. Effect of attractants on fruit set

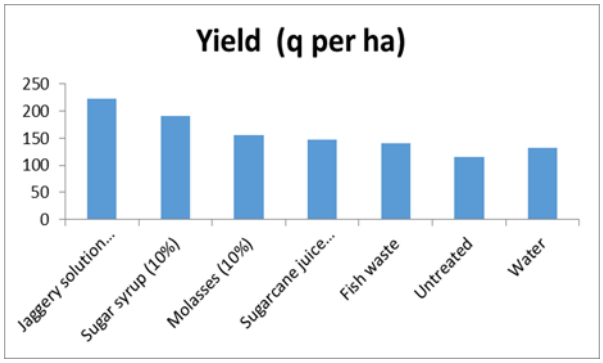

Figure 7. Effect of attractants on yield per hectare

(190.00 ± 0.16 q), (and 155.22 ± 0.06 q), (147.50 ± 2.50 q), and (140.35 ± 0.06 q respectively). However, yield less was recorded in plants kept untreated (115.00 ± 0.12 q). Each treatment proved to be significantly superior over control (132.50 ± 2.50 q). Our results are in line with the findings of schultheis et al., [10] and Prakash [11] on ridge gourd. (Figure 7, Table 1).

Table 1. Influence of different attractants on quantitative parameters of cucumber (*Cucumis sativus* L.)

Treatment	Fruit number per plant	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (kg)	Seed number per fruit	Yield (q per ha)	Fruit set (%)
Jaggery solution (10%)	8.87 ± 0.14	26.02 ± 0.47	5.77 ± 0.02	0.350 ± 0.02	453.07 ± 4.98	222.50 ± 4.78	69.74 ± 0.62
Sugar syrup (10%)	8.72 ± 0.02	25.07 ± 0.18	5.60 ± 0.04	0.321 ± 0.01	423.65 ± 1.97	190.00 ± 0.16	62.38 ± 0.68
Molasses (10%)	8.45 ± 1.02	23.98 ± 0.21	5.45 ± 0.03	0.305 ± 0.05	389.84 ± 14.23	155.22 ± 0.06	56.65 ± 1.07
Sugarcane juice (10%)	7.85 ± 0.91	23.05 ± 0.29	5.12 ± 0.13	0.280 ± 0.02	346.08 ± 2.77	147.50 ± 2.50	49.45±2.64
Fish waste	7.52 ± 0.25	21.66 ± 0.23	4.85 ± 0.11	0.268 ± 0.03	307.96 ± 9.58	140.35 ± 0.06	43.23±2.45
Untreated	6.47 ± 0.25	19.31 ± 0.37	4.20 ± 0.21	0.205 ± 0.06	147.71 ± 7.48	115.00 ± 0.12	33.44 ± 1.43
Water	7.15 ± 0.15	20.40 ± 0.16	4.52 ± 0.28	0.244 ± 0.02	212.95 ±6.31	132.50 ± 2.50	37.85 ± 2.00
C.D ($p \leq 0.05$)	0.07	0.97	0.08	0.001	27.89	7.36	3.74

Conclusion

Attractants play a beneficial role in enhancing pollination due to maximum foraging activity of pollinators which improves the quantitative characteristics of cucumber. Jaggery solution (10%) proved highly effective among different attractants in improving the yield contributing characters like fruit number per plant, length of fruits, fruit diameter, fruit weight, seed number per fruit, yield per plant, yield per ha as well as fruit set. Sugar syrup (10%), Molasses (10%), sugarcane juice (10%) and fish waste proved to be as next best attractants. Overall, this study demonstrates that using attractants to improve the quantitative characteristics of cucumber is a beneficial strategy.

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