

IMPACT OF BEE ATTRACTANTS ON THE QUANTITATIVE AND QUALITATIVE PARAMETERS OF SUNFLOWER

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Abstract: Honey bees visitation enhance quantitative and qualitative parameters. The seed set % were noticed higher number of bold seed (61%) and lowest number of chaffee seed (3.87) was produced in the crop that received Jaggery solution 15% in sunflower Thousand seed weight (47.00g) was maximum in sunflower treated with 15% jaggery solution and minimum recorded on 10% glucon- D solution (39.00g). Similarly highest seed yield q/ha observed on 15% jaggery solution treated plot and minimum without treated plot was (14.76q/ha and 9.27q/ha). The qualitative parameter significantly, highest germination percent was recorded in treatment jaggery solution 15% (95.00%). However, lowest germination percent was found in control treatment without any spray (81.67).

Keyword: Sunflower, Bee attractants, Pollinators, Parameters

INTRODUCTION

Sunflower, *Helianthus annuus* L. (Family: Compositae) is one of the fastest growing oilseed crops in India and is popularly known as 'Surajmukhi' or 'Suryakanthi'. It cultivated in an area of 0.26 million hectares, with a production of 0.21 million tones, and productivity 825 kg/ha. Contribution of India oilseed production is about 3.85% (FAO 2019). Together, the three southern states of India, Karnataka, Maharashtra and Andhra Pradesh account for 87.95% of the sunflower and 79.96% of its production with an annual production of 0.17 million tons, Karnataka ranks first in the country, with an area of 0.35 million ha (Anon., 2016). Sunflower is the second most common oil seed crop in the world after soybean. It is an important crop in temperate countries such as the USA, Romania, Bulgaria, Canada and Russia. India has the fourth largest sunflower field (2.15 m ha) in the world. Sunflower is ranked fourth among oil-seed crops and is treated as a major oilseed crop for both domestic and commercial uses. The sunflower is protandrous in which at various stages the male and female sections mature. (DeGrandi Hoffman and Watkins, 2000).

A rough, hairy stalk, rough leaves, wide, coarsely toothed, and circular flower heads are present in the

plant. Each sunflower flower is made up of the typical flower structures: receptacle, peduncle, sepal, petals, stamen, and a pistil. (Bidlack and Shelly, 2011). It has very valuable agronomic features, such as resistance to drought, heat and cold. Sunflower productivity is a key economic alternative to crop rotation and provides intercropping and crop succession in seed-producing areas (Porto *et al.* 2007). It is cultivated primarily for the production of seeds. Sunflower currently 4th ranks among oilseed crops. Sunflower seeds are a good source in essential fatty acids containing 49 percent oil. The seed meal produced after oil extraction includes protein, minerals, carbohydrates and a healthy amino acid profile (Nasir *et al.*, 2011).

MATERIALS AND METHODS

The experiment was conducted at Research-cum-Instructional Farm of Raj Mohini Devi College of Agriculture and Research Station, Ambikapur (C.G.) during *kharif* season 2020-21, which is situated at 23.15° North latitude and 83.15° East longitude and at an altitude of 623 meters above from mean sea level (MSL). The general climate condition of Surguja (Chhattisgarh) is Eastern Plateau and Hilly region with average rainfall 1422.8 mm.

Table 1. Treatment details

S. No.	Treatment details	Concentration	Dose
T ₁	Jaggery solutions	10 %	100g/L
T ₂	Jaggery solutions	15 %	150g/L
T ₃	Sugar solutions	10 %	100g/L
T ₄	Sugar solutions	15 %	150g/L
T ₅	Glucon -D + milk powder	10 %	100g/L
T ₆	Glucon-D	10 %	100g/L
T ₇	Control	-	-

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Observations on the following quantitative and qualitative yield parameters were recorded to study influence of bee attractants in sunflower.

(1) Percentage seed set: 10 plants randomly selected from each treatment and number of Chaffee and bold seed/head were counted separately and the mean number were calculated and expressed as percentage seed set/head.

(2) 1000 seed weight: One thousand seeds from the each treatment selected randomly from each treatment separately and the weight were recorded by using electronic balance.

(3) Seed yield: Each plot was harvested treatment wise separately and the total seed yield per net plot was recorded and then these values will be converted into yield per hectare in quintals.

(4) Germination percentage: This observation was undertaken in the seed of sunflower crop and germination test carried out as per standard procedure using paper method. The rolled paper towels were placed at slanting position in a cabinet seed germinator maintained at a constant temperature of 25°C and 95% RH the number of seeds germination counted and expressed in percentage.

Germination % =

$$\frac{\text{No of germinated seed}}{\text{Total no of seed used}} \times 100$$

RESULTS AND DISCUSSION

Observations on the following yield parameters were made to study the influence of bee attractants in sunflower.

Quantitative parameters

Percentage seed set:-

The percent of Chaffee and Bold seeds per head was statistically significant with control treatment (without any spray).

Chaffee seed

The lowest percent of chaffee seed per head was recorded significant in treatment T₂ - jaggery solution 15% (3.87). The second best treatment was T₄ -sugar solution 15% (4.33) followed by T₁ - jaggery solution 10% (4.63), T₅ - Glucon-D + milk powder solution 10% (4.80), T₃ sugar solutions 10% (5.00) and T₆ Glucon-D 10% (5.50). The highest percent of Chaffee seed per head was recorded in treatment T₇ (without any spray)5.97) (Fig.1).

Bold seed

The maximum percent of bolt seed per head was recorded in treatment T₂ jaggery solution 15% (61.93). The second best treatment was T₄ - sugar solution 15% (56.33) followed by T₁ - jaggery solution 10% (53.80), T₅ - Glucon-D + milk powder solution 10% (52.30), T₃ sugar solutions 10% (50.87) and T₆ Glucon-D 10% (47.00). The lowest

percent of bolt seed per head was recorded in treatment T₇ (without any spray 41.00) (Fig.2).

1000 seed weight (g)

Significantly higher test weight treatment T₂ - jaggery solution 15% recorded (47.00) which accounted for the other spray plots. The next best treatment was T₄ - sugar solution 15% recorded (45.50) followed by sugar solution 10% (43.05) respectively. T₅- T₅ Glucon-D + milk powder 10% (42.13) test weight was recorded. T₁ jaggery solution 10% recoded (41.55), T₆ Glucon-D 5% (39.00). The lowest test weight per treatment was recorded in treatment T₇ (without any spray 36.67) (Fig.3).

Seed yield per plot (Q/ha)

Higher seed yield was obtained from the crop sprayed with T₂ - jaggery solution 15% recorded (14.76), which accounted for the other spray plots. The next best treatment was T₄ - sugar solution 15% recorded (13.36) followed by T₃ sugar solution 10% (12.34) respectively. T₁- jaggery solution 10% (12.28) yield was recorded. T₅ Glucon-D + milk powder 10% recoded (12.21), T₆ glucon-D 10% (10.54). The lowest yield per treatment was recorded in treatment T₇ (without any spray 9.27) (Fig.4).

B. Qualitative parameters

Germination percentage (%)

The germination percent of seeds ranged from 81.67 to 95.00 among the various treatments however, this variation was in significant. The maximum germination percent was accounted in T₂ - jaggery solution 15% spray plots in (95.00%). The next best treatment was T₁ - jaggery solution 10% recorded (93.00%) followed by T₄ sugar solution 15% (91.33%) respectively. T₃- glucon-D + milk powder solution 10% (90.67%) germination percentage was recorded. T₃ sugar solution 10% recorded (89.67%), T₆ glucon - D 10% (88.00). The lowest germination percent was recorded in treatment T₇ (without any spray 81.67) (Fig.5).

These results are in close agreement with finding of Jayaramappa and. Bhargava (2015) The use of bee attractants, Bee-Q and Fruit Boost™ in the pollination of Sunflower was evaluated that the bee attractants significantly enhanced the seed set, seed weight, and germination of sunflower. Also Jayaramappa *et al.* (2011) reported that influence of bee attractants on yield parameters of Ridge Gourd (*Luffa acutangula* L.) (Cucurbitaceae). Mehmet Oz *et al.* (2009) also reported that the use of honeybees for sunflower hybrid seed production improved seed ratio, 100 seed weight, number of filled seed per head and seed yield per head. This was in conformity with the results obtained in this experiment. Manhare and Painkra (2018) on buckwheat and Tiwari (2020) on niger.

Table 2. Quantitative and Qualitative parameters of Sunflower.

S. No.	Treatments	Seed Set (%)		1000 seed weight (g)	Seed yield (q/ha)	Germination (%)
		Chaffee	Bold			
T1	Jaggery solutions (10%)	4.63	53.80	41.55	12.28	93.00
T2	Jaggery solutions (15%)	3.87	61.93	47.00	14.76	95.00
T3	Sugar solutions (10%)	5.00	50.87	43.05	12.34	89.67
T4	Sugar solutions (15%)	4.33	56.33	45.50	13.36	91.33
T5	Glucon-D + milk powder (10%)	4.80	52.30	42.13	12.21	90.67
T6	Glucon-D (10%)	5.50	47.00	39.00	10.54	88.00
T7	Control	5.97	41.00	36.67	9.27	81.67
SEm ±		3.53	3.75	1.30	0.90	0.63
CD at 5%		10.87	11.56	4.06	2.77	1.96

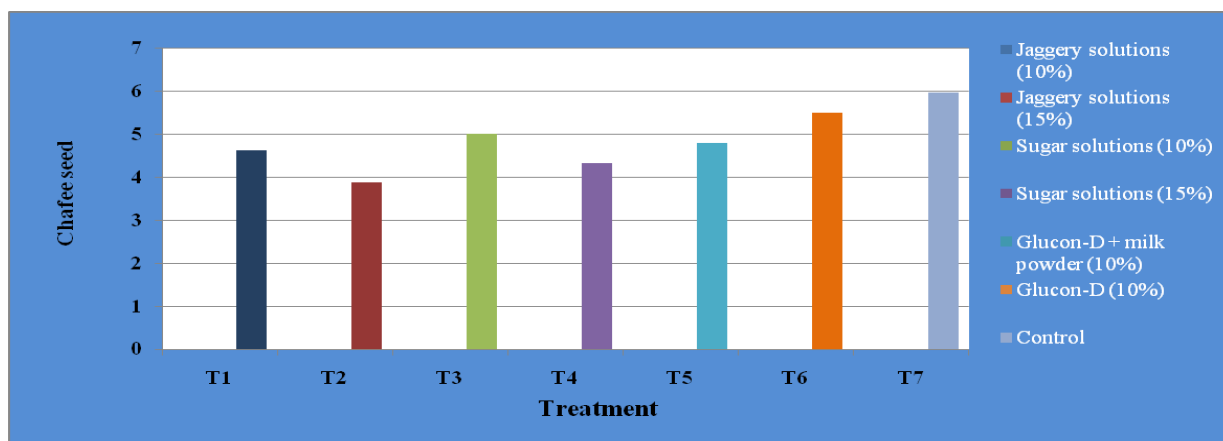


Fig. 1. Chaffee Seed %

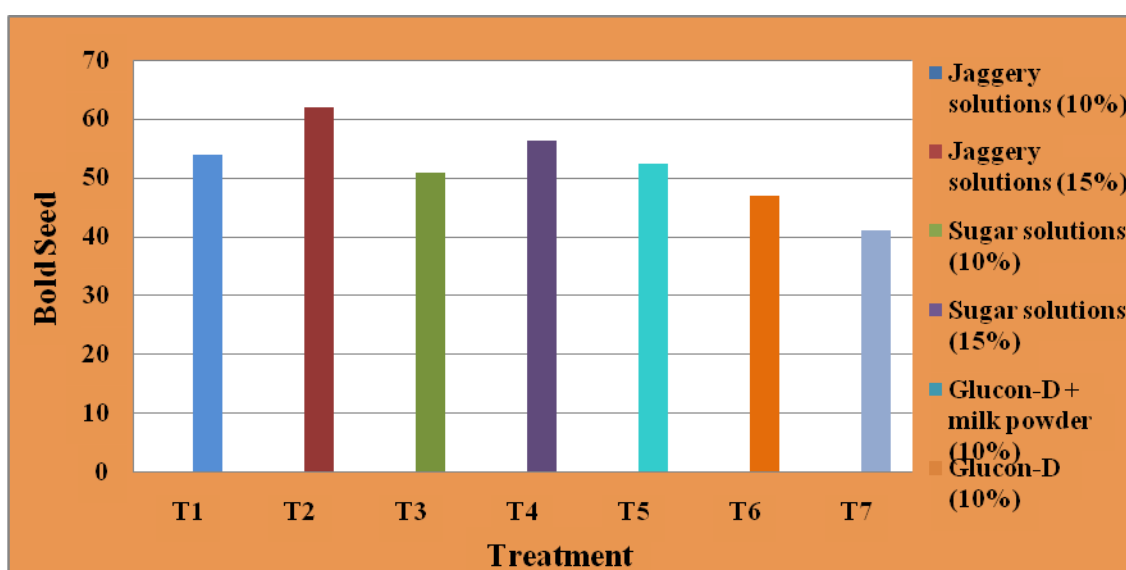


Fig. 2. Bold seed %

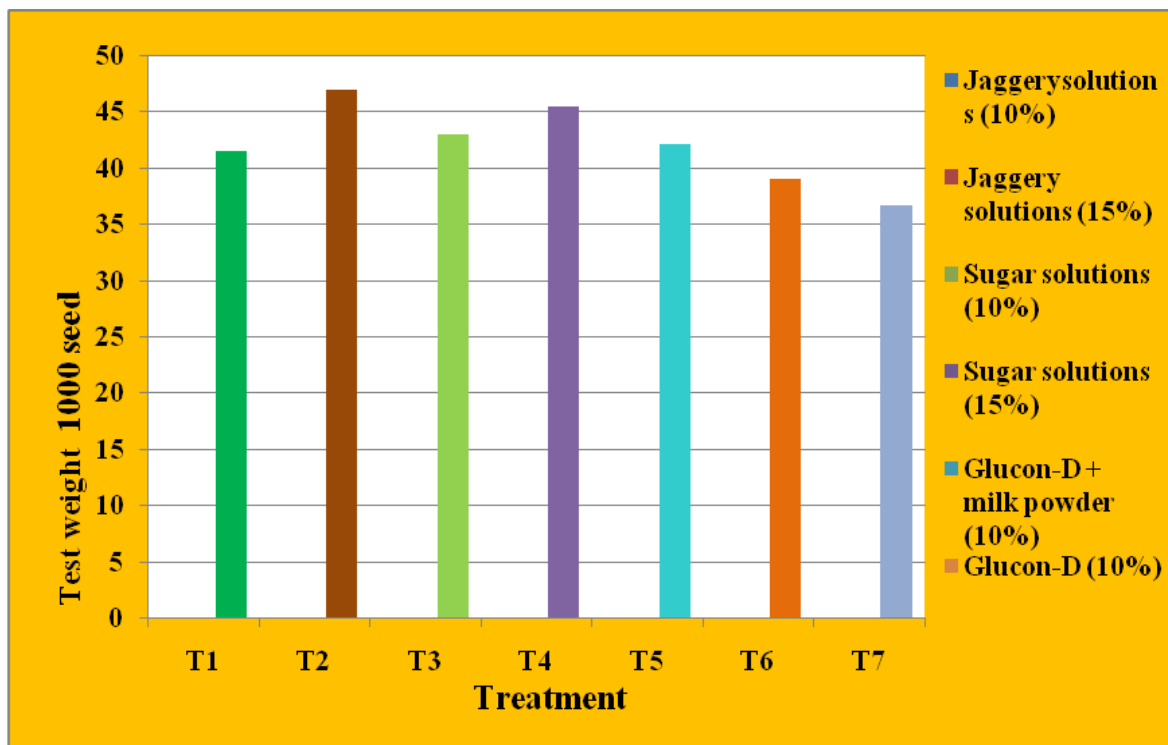


Fig. 3. 1000 seed weight (gm)

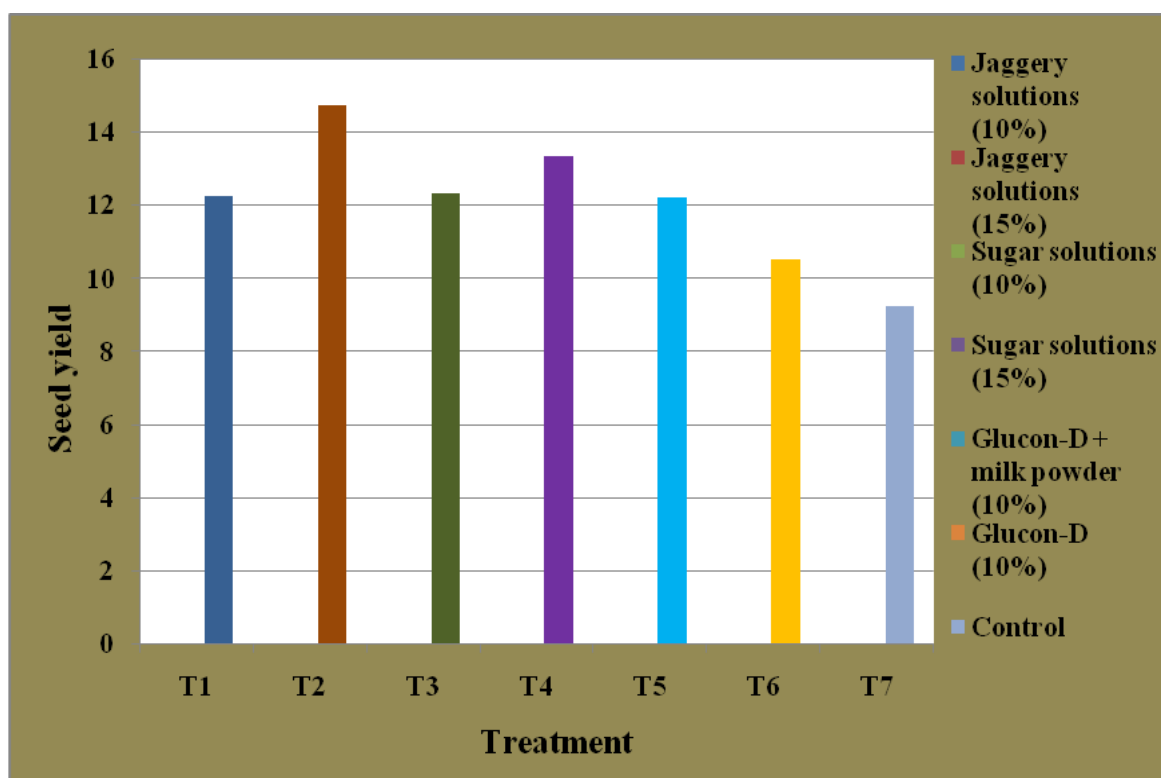


Fig. 4. Seed yield Q/hac

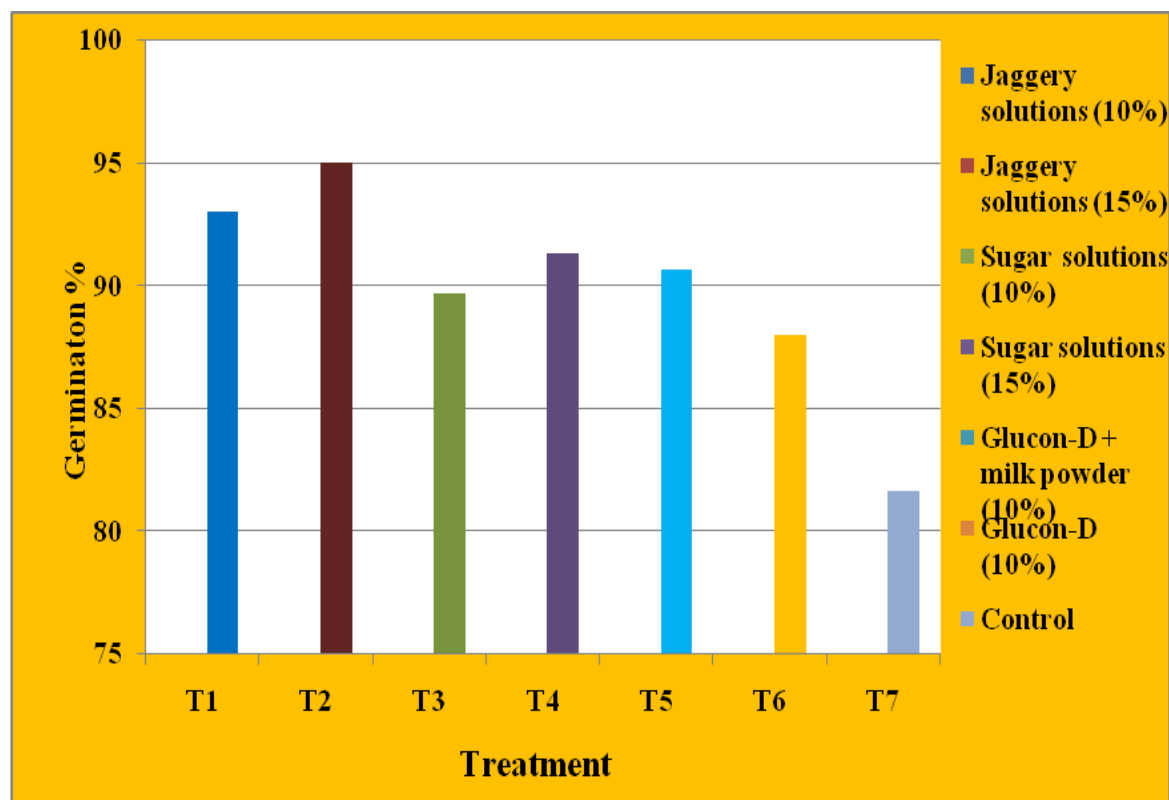


Fig. 5. Germination %

CONCLUSION

Based on obtained results following conclusions can be drawn:-

1. 12 insect species were found to visit sunflower-flowers. The *Apis cerana indica* was dominant bee species in sunflowers. Other dominant pollinators were *Apis dorsata*, *Apis mellifera* and *Apis florea* among all the pollinators/visitors.
2. The jaggery solution (15%) was good bee attractants followed by sugar solution (15%), jaggery solution (10%) and sugar solution (5%).
3. Significantly higher seed yield was obtained from 15% jaggery followed by 15% sugar solution.
4. Significantly higher germination percentage was obtained from 15% jaggery followed by 15% sugar solution.

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