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Nagendra MS
Department of Seed Science and Technology, College of Horticulture, Kerala Agriculture University, Thrissur, Kerala, India

Dr. Dijee Bastian
Department of Seed Science and Technology, College of Horticulture, Kerala Agriculture University, Thrissur, Kerala, India

Dr. Rose Mary Francies
Department of Seed Science and Technology, College of Horticulture, Kerala Agriculture University, Thrissur, Kerala, India

Ambavane Ajinkya Rajendra
Department of Plant Breeding and Genetics, College of Horticulture, Kerala Agriculture University, Thrissur, Kerala, India

Correspondence
Nagendra MS
Department of Seed Science and Technology, College of Horticulture, Kerala Agriculture University, Thrissur, Kerala, India

Effect of sowing time on fruit and seed yield in oriental pickling melon (*Cucumis melo* var. *conomon*)

Nagendra MS, Dr. Dijee Bastian, Dr. Rose Mary Francies and Ambavane Ajinkya Rajendra

Abstract
An experiment was conducted in randomized block design with three replications to determine the optimum time of sowing better seed yield of oriental pickling melon between August and February months of 2016 and 2017. Sowing on August produced highest fruit length, fruit diameter and fruit weight and fruit yield per plant. Least values of fruit attributes were observed in November sowing. Seed yield attributes were significantly influenced by time sowing. Highest number of seeds per fruit, fresh weight and dry weight was noticed in August sown crop. Hundred seed weight was not affected by dates of sowing. Vivipary occurrence which is detrimental in seed production was noticed to severe in December sown crop.

Keywords: oriental pickling melon, sowing time, fruit and seed yield

1. Introduction
Cucurbits are a major group of summer vegetable crops belonging to the family Cucurbitaceae. The family comprises of about 117 genera and 825 species in tropics. Nevertheless, there are 21 cultivated species in cucurbits. It includes crops like cucumbers, squashes (including pumpkin), luffas, melons and watermelons. One of the significant members of the family is Oriental pickling melon which is believed to be the most ancient kind of melon domesticated in China (Walters and Wehner, 1989) [7].

The oriental, pickling melon (*Cucumis melo* var. *conomon*) is considered as the most ancient form of melon domesticated. Oriental melon is cultivated in Asia-India, China, Japan, Korea and southeast Asia. Oriental pickling melon are usually sown in the month September and January for crop production. Sowing time and inter cultivation practices are nonmonetary inputs that can amend the income for a farmer. The time of sowing has a crucial role in improving the seed production by catching early rains, improved seed yield and most importantly escape from pest and disease thereby maintaining the seed quality. Despite the wide research carried out and information disseminated, the importance of appropriate sowing time for quality seed production in oriental pickling melon is still lacking.

2. Material and methods
The field experiment was conducted at the Department of Seed Science and Technology. College of Horticulture, Kerala Agricultural University (KAU), Vellanikkara, Thrissur, between August 2016 and April 2017. The site is located at 10^0 54' North Latitude and 76° 28' East longitude. Randomised block design was followed with three replications in each treatment. The seeds were soaked for 24 hours and later sown in the field on the first day of every month from August 2016 to February 2017 at monthly intervals. The crop was raised as per recommendations in the package of practices of Kerala Agricultural University (2015). Fruits were harvested separately at physiological maturity and fruit yield attributes like fruit length, fruit diameter, fruit weight and fruit yield per vine were recorded and average value was expressed in centimetre and kilograms respectively. Seeds were extracted from the fruit used for recording length and diameter and number of seeds per fruit, fresh and dry weight of seeds per fruit. The observations were recorded from ten plants per replication. The date on weather parameters prevailing at the time of crop sowing, growth and harvest are presented in the Table 1.

3. Results and discussion

The results of the study are depicted in Table 2 and 3. Results of the study revealed that the date of sowing has a significant influence on the number of days taken for female flower emergence, fruit yield attributes like fruit length, fruit diameter, fruit weight and fruit yield per vine and seed attributes like number of seeds per fruit, fresh and dry weight of seeds per fruit.

Table 1: Monthly meteorological data from June 2016 to May 2017

Months	Temperature (℃)		Relative humidity (%)	Rainfall (mm)	Rainy days	Sunshine hours hrs./day
	Mean maximum	Mean minimum				
June -16	29.8	21.7	89	654.7	22	1.6
July -16	29.9	21.6	85	390.4	19	2.3
August-16	30.4	23.2	83	183.5	19	4.9
September-16	30.3	23.6	82	86.0	10	4.8
October-16	31.5	22.7	81	37.3	4	5.5
November-16	32.9	22.2	69	13.8	1	5.8
December-16	32.4	22.3	69	52.9	3	6.5
January-17	32.7	22.9	53	0.0	0	7.6
February-17	34.1	23.2	51	0.0	0	8.7
March-17	36.1	24.7	67	13.2	1	7.4
April -17	35.7	26.0	70	19.1	1	6.5
May-17	34.6	24.9	72	167.5	11	5.5

Table 2: Influence of dates of sowing on fruit and fruit yield attributes

Treatment	Days to first flowering (female flower)	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (g)	Fruit yield per vine (kg)
T_1 (August)	57.00	20.92	32.26	1.15	2 .99
T_2 (September)	54.66	17.79	29.66	0.79	1.56
T_3 (October)	54.66	17.13	28.43	0.63	1.10
T_4 (November)	48.33	17.38	28.27	0.60	1.04
T_5 (December)	44.33	17.32	29.05	0.67	1.25
T_6 (January)	43.90	17.11	28.81	0.67	1.24
T_7 (February)	42.66	17.58	28.71	0.62	1.05
Mean	49.36	17.89	28.54	0.73	1.20
SE±	1.24	0.63	0.43	0.045	0.12
CD (0.05)	3.88	1.82	1.36	0.14	0.37

Table 3: Effect of dates of sowing on seed yield attributes

Treatment	Seeds per fruit	Seed yield per hectare (kg)	Fresh weight of seed per fruit (g)	Dry weight of seeds per fruit (g)	100 seed weight (g)	Vivipary (%)
T_1 (August)	499.07	10.15	16.47	8.82	1.74	1.47
T_2 (September)	458.37	8.70	16.07	8.12	1.77	0.00
T_3 (October)	453.52	8.14	15.27	6.90	1.71	0.00
T_4 (November)	386.49	8.02	13.77	6.59	1.77	0.00
T_5 (December)	344.05	7.89	13.87	6.54	1.77	6.25
T_6 (January)	319.13	6.96	12.38	5.34	1.60	3.60
T_7 (February)	300.52	6.03	11.34	4.70	1.53	1.44
Mean	394.45	7.9	14.16	6.71	1.70	1.82
SE±	32.065	4.92	1.08	0.54	0.14	1.64
CD (0.05)	99.897	1.788	3.378	1.69	N/S	N/S

Days taken for first female flower was significantly influenced by time of sowing. It was observed that in November (T_4) to February (T_7) sown plants the female flower emergence was early but in August (T_1) and September (T_2) sown plants the female flower emergence was delayed. This may be due to relatively less mean maximum temperature (30.4 ℃ and 30.3 ℃) and more rainfall (183.5 and 86.0 mm) during August (T_1) and September (T_2) months compared to other sowings which had a encouraging influence on the growth and development of mother plants but in November to February sowings scanty rain fall accompanied by high temperature led to rapid evaporation from soil surface resulting in moisture stress hence forcing the plant to enter into the reproductive phase. These findings are in coordination with the results of Morsey *et al.* (2016) [5] in soybean.

Fruit length and diameter was highest in August (T_1) sown crop (20.92 and 32.25 cm) followed by September (T_2) sown crop (17.79 and 29.66 cm) but in later sowings from October (T_3) to February (T_7) a reduction in fruit diameter was noticed but the fruit length was not much effected by the date of sowing. Fruit length was lowest in T_6 (17.11 cm) *i.e.*, January sowing and fruit diameter was lowest in T_7 (28.71 cm) *i.e.*, February sowing. This may be due to the climatic conditions that were prevailing at the crop growth stage. High relative humidity during the months of August (83 %) and September (82 %) which was comparatively higher than the other months which lowered the evaporation of moisture from soil and fruit surface and encouraged better fruits development but in subsequent sowings the relative humidity was low due to increasing temperature leading to faster evaporation of moisture from the fruit surface leading to reduction in fruit

diameter. Observations of Sare *et al.* (1999) [6] in Cucumber and Incalcaterra and Iapichino (2000) [3] in cauliflower confirm the influence of the climatic conditions in characters like fruit diameter.

Fruit weight and fruit yield per vine were highest in T_1 and T_2 sowings *i.e.,* August (1.15 and 2.99 kg) and September (0.794 and 1.56 kg) sowing and lowest was observed in T_4 *i.e.,* November (0.600.94 and 1.04 kg) sown plants. The higher fruit weight and fruit yield per vine in August and September sowing can be attributed to the low temperature and high relative humidity at the seed production time resulting in better absorption of moisture from soil increasing the fruit length and diameter and thereby increasing the fruit weight. Similar results were obtained by Sare *et al.* (1999) [6] in cucumber and Latifi *et al.* (2012) [4] in *Cucurbita pepo.*

Significantly higher number of seeds per fruit was obtained when sowing was done in the August (499) and September (458) but at subsequent sowings from October to November a gradual decrease in number seeds per fruit was noticed. Lowest number of seeds per fruit was observed in T_7 (300) *i.e.,* February sowing. Higher number of seeds per fruit observed in the months of August and September was due to the favourable climatic conditions during the growing period. At low temperatures the activity of pollinators is high which gets reduced at high temperatures. During the later sowings more sunshine hours confined the pollinators visit to the flower for shorter periods such as early mornings and late evenings. The effect of congenial environment and its consequent effect on pollinator activity has also been documented by Latifi *et al.* (2012) [4] in *Cucurbita pepo* and Husain and Kumar (2006) [2] in mustard.

Fresh and dry weight of seeds per fruit were found significantly higher in T_1 *i.e.,* August sown crop (16.47 and 8.82) which were on par with T_2 *i.e.,* September sown crop (16.07 and 8.12) and least was noticed in T_7 *i.e.,* February sown crop (7.79 and 3.79). Higher fresh weight and dry weight of seeds per fruit noticed in September and August sown crops may be due to the higher number of seeds per fruit obtained during the respective month of sowing.

Time of sowing had no influence on the 100 seed weight of oriental pickling melon and the observation was not much affected by environmental factors like maximum temperature, relative humidity and duration of sunshine. This may be because the same variety was used for sowing in all the months. Similar observations were recorded by Afroz *et al.* (2011) [1] in mustard.

The all fruit and seed yield attributes were highest from the crop sown in months of August and September. We suggest this month for sowing for quality seed production in oriental pickling melon under Kerala climatic condition.

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