



Effect of insect-proof net house on flowering and seeds quality of cucumber (*Cucumis sativus*)

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Cucumber (*Cucumis sativus*) belonging to the Cucurbitaceae family is important of summer vegetable crop cultivated throughout India. Cucumber plant has climbing and trailing habit and tender cucumber can be eaten raw or with salt in salad. Cucumber contains unique antioxidants in moderate ratios such as B-carotene and α -carotene, vitamin-c, vitamin-A, Zeaxanthin, and lutein. Cucumber crop is extensively grown during *kharif* and summer in all parts of India, but seed production especially hybrid seed production requires vigorous growth, higher number of female flower in seed parent and higher fruit set for better fruit maturation and development attributes. Hybrid seed production under north Indian condition cannot be organized successfully in open field condition because of high incidence of viral diseases and white fly attack in *kharif*. The seed crop grown under insect-proof net house overcomes the threats of insect vectors, viral diseases and unfavourable climatic conditions (Flemin *et al.* 2012) and Bontha *et al.* (2015). Hence, the present investigation was planned to study the effect of insect-proof net house on seed quality of cucumber (Pant Sankar Khira-1) during hybrid seed production.

The present investigation was carried out during *kharif* 2013-14 at Centre for Protected Cultivation Technology, Indian Agricultural Research Institute, New Delhi and CCR (PG) College, Muzaffarnagar (UP) under two different growing environments, i.e insect proof net house and open field condition. The hybrid selected for the experiment was Pant Shankar Khira-1. The fruits are long (about 20 cm), cylindrical and green with light strips. Insect proof net house was fabricated by using 40 mesh UV stabilized nylon net, white in colour with double door facility, with 2 m² waiting area and having dimensions 60 m × 6 m × 2 m was used for raising hybrid seed crop. Thirty plants were randomly selected in both the growing conditions for

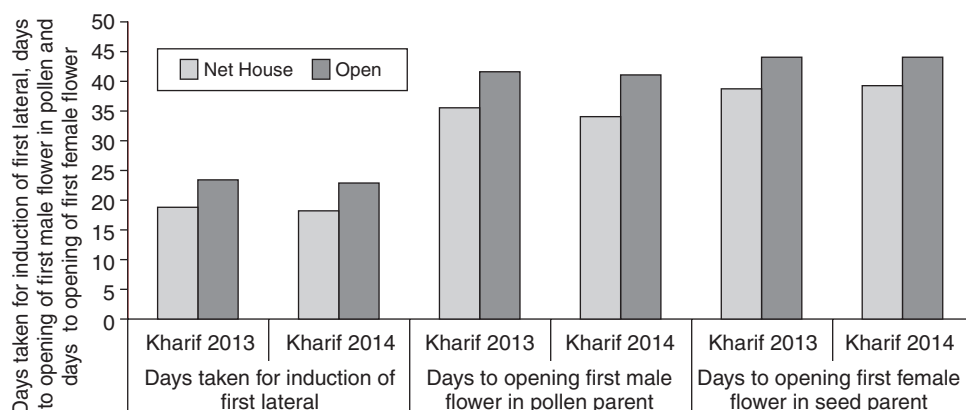
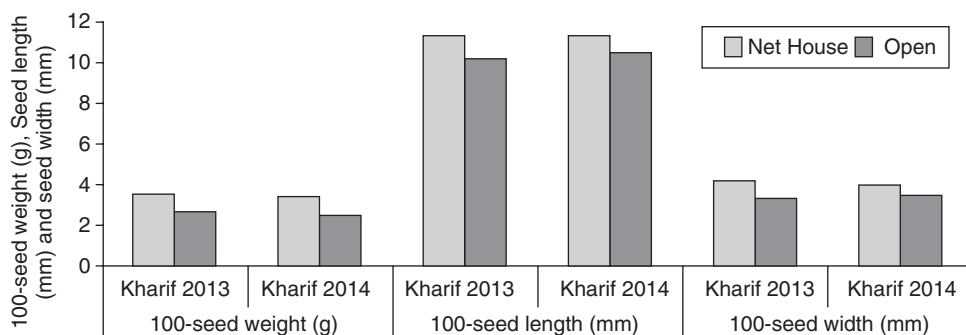
recording the observations, viz. days taken for the opening of first female flower in seed parent, and first male flower in pollen parent, number of female flower per plant in seed parent, number of male flower per plant in pollen parent, number of flowers pollinated per plant, number of fruit set per plant, number of mature fruit per plant, seed length, seed width, 100-seed weight, germination %, vigour indices, electrical conductivity. The laboratory tests were carried out at post graduate laboratory, IARI, New Delhi which includes germination (%) (ISTA 2012), seedling length (cm), vigour index-I & II (Abdulkali and Anderson 1973) and electrical conductivity (Dadlani and Agarwal 1987). The quantitative data generated were analyzed statistically by using SAS 9.2 for testing the heterogeneity of means adopting the independent 't-test' procedures. The quantitative data generated were analysed statistically for testing the heterogeneity of means adopting the 't-test' procedures. The probability was worked out at 5% (P=0.05) and wherever t- value is non-significant, it is denoted by NS.

Flowering behaviour of parental lines: Flowering behavior traits of parental lines showed highly significant difference between both the growing conditions (Table 1 and Fig 1). In insect proof net house, 39.0 days were taken for the opening of the first female flower in the seed parent while under open field conditions, it took 44.15 days. The total number of female flowers per plant up to 30 days after the appearance of first flower was significantly higher in insect proof net house 25.42 as compared to open field (8.81). In insect proof net house, 34.90 days were taken to the opening of first male flower in pollen parent but under open field conditions, it took 41.37 days. The total number of male flowers per plant up to 30 days after the first male flower appearance was also significantly higher in insect proof net house (36.57) in comparison to open field conditions (18.16). The results are in conformity with Wien *et al.* (2004), Singh and Sirohi (2006) who reported that flowering, sex expression, and fruiting of pumpkin (*Cucurbita* sp.) cultivars under various temperatures in greenhouse and distant field trials and protected cultivation

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Table 1 Effect of insect proof net house on seedling growth and flowering behaviour of cucumber (Pant Shankar Khira-1) during *kharif* 2013-14.

Growth condition	Germination (%)	Seedling length (cm)	Vigour index I	Vigour index II	Electrical conductivity (mmho/g/cm)	Days to opening of first male flower in pollen parent	Days to opening of first female flower in seed parent	No. of male flower/plant in pollen parent	No. of female flower/plant in seed parent
Net house	87.21	31.43	2825.54	11.08	11.22	34.90	39.00	36.57	25.42
Open	82.02	26.38	2224.83	7.62	12.03	41.37	44.15	18.16	8.81
CD at 5%	4.54	3.41	34.69	1.46	1.40	4.06	3.87	3.81	3.19
SE (d)	2.06	1.55	15.75	0.66	0.60	1.84	1.75	1.73	1.44

Fig 1 Effect of growing conditions on days taken for induction of first lateral, days to opening of first male flower in pollen and days to opening of first female flower in pollen parent of cucumber (Pant Shankar Khira-1) during *kharif* 2013 and 2014.Fig 2 Effect of growing conditions on 100-seed weight (g), seed length (mm) and seed width (mm) of cucumber during *kharif* 2013 and 2014.

proof net house showed lowest electrical conductivity (11.22). The less electrical conductivity under insect-proof net house was due to well-developed seed coat which releases less seed lechate as compared to open field grown seeds which released more seed lechate. Similar results were obtained by Xavier *et al.* (2010) in pumpkin hybrid seed production, Jat *et al.* (2016) in bitter gourd hybrid seed production, Kunj Bhihari *et al.* (2012) in summer squash hybrid seed production, Bontha *et al.* (2015) under insect proof net house and Girish Kaddi *et al.* (2014) in cucumber hybrid seed production under different growing conditions, i.e. poly house, insect proof net house and open field.

It could be concluded that hybrid seed production of cucumber cv. Pant Sankar Khira-1 should be undertaken in insect proof net house in *kharif* condition. The

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Seed quality attributes of hybrid: The data (Table 2 and Fig 2) showed significantly higher values for seed length (mm), seed width (mm), seed coat weight, cotyledon weight (g) and 100 seed weight were significantly higher in insect proof net house (11.32, 4.11, 0.13, 0.13 and 3.48 respectively) compared to open field condition (10.36, 3.39, 0.10, 0.14 and 2.59 respectively). The germination percentage, seedling length, vigour index I and II were significantly higher in insect proof net house (87.21, 31.43 cm, 2825.54 and 11.08 respectively) but significantly lower in open condition (82.02, 26.38 cm, 2224.83 and 7.62 respectively). Among the growing environments the insect-

Table 2 Effect of insect proof net house on seed length, seed width, cotyledon weight, seed coat weight and 100-seed weight, of cucumber (Pant Shankar Khira-1) during hybrid seed production in *kharif* 2013-14

Growth condition	Seed length (mm)	Seed width (mm)	Cotyledon weight (g)	Seed coat weight (g)	100 seed weight (g)
Net house	11.32	4.11	0.13	0.13	3.48
Open	10.36	3.39	0.14	0.10	2.59
CD at 5%	1.58	0.52	0.012	0.004	1.05
SE (d)	0.69	0.29	0.004	0.002	0.43

growing of seed crop under insect proof net house can fetch much higher net returns as compared to open field grown seed crop of cucumber.

SUMMARY

An experiment was carried out during *kharif* 2013-14 under insect proof net house and open field at Centre for Protected Cultivation Technology, IARI, New Delhi and CCR (PG) College, Muzaffarnagar (UP) in Cucumber cv. (Pant Sankar Khira-1). Opening of first female and male flower in seed and pollen parents (39.0 and 34.90 days) was significantly lower under insect proof net house compared to open field condition (44.15 and 41.37 days). The production of number of female and male flowers (25.42 and 36.57) in seed and pollen parents was significantly higher under insect proof net house compared to open field condition (8.81 and 18.16). Seed length was significantly higher under insect proof net house (11.32 cm) in compared to open field condition (10.36 cm). Seed width(mm), seed coat weight(mm), cotyledon weight(g) and 100 seeds weight(g) were also significantly higher under insect proof net house (4.11, 0.13, 0.13 and 3.48 respectively) than open field condition (3.39, 0.10, 0.14 and 2.59, respectively). The germination percentage, seedling length, vigour index I and II also exhibited the same trend being significantly higher under insect proof net house (87.21, 31.43 cm, 2825.54 and 11.08, respectively) compared to open field condition (82.02, 26.38 cm, 2224.83 and 7.62, respectively). Electrical conductivity was lower under insect proof net house (11.22) but higher in open field condition (12.03).

REFERENCES

- Abdul-baki A A and Anderson J D. 1973. Vigour determination in soybean by multiple criteria. *Crop Science* **13**: 630–73.
- Vidyadhar B, Tomar B S, Singh B and Behera T K. 2015. Effect of methods and time of pollination on seed yield and quality parameters in cherry tomato grown under different protected conditions. *Indian Journal of Horticulture* **72**(1): 61–6.
- Dadlani M and Agrawal P K. 1987. *Techniques in Seed Science and Technology*. South Asian Publishers, New Delhi.
- Flemine X. 2010. 'Studies on hybrid seed production in pumpkin under insect proof net house and open field conditions'. M Sc. Thesis, Indian Agricultural Research Institute, New Delhi.
- Kaddi G, Tomar B S, Singh B and Kumar S. 2014. Effect of growing conditions on seed yield and quality of cucumber (*Cucumis sativus*) hybrid. *Indian Journal of Agricultural Sciences* **84** (5): 624–27.
- Jat G S, Singh B, Tomar B S, Singh J, Ram H and Kumar M. 2016. Seed yield and quality as influenced by growing conditions in hybrid seed production of bitter gourd (*Momordica charantia* L.) cv. Pusa hybrid-1. *Journal of Applied and Natural Science* **8**(4): 2111–15.
- Bihari K, Singh B, Tomar B S and Kumar M. 2012. Effect of growing conditions, time of pollination and fruit retention in hybrid seed production of summer squash (*Cucurbita pepo*). *Journal of Seed Research* **40**(1): 21–9.
- Singh B and Sirohi N P S. 2006. Protected cultivation of vegetables in India: problems and future prospects. *Acta Horticulture*. 710:339-42. Wien H C, Stapleton S C, Maynard D N, Mc Clurg C and Riggs D. 2004. Flowering, sex expression, and fruiting of pumpkin (*Cucurbita* sp.) cultivars under various temperatures in greenhouse and distant field trials). *Hort Science* **39**(2): 239–42.