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PERFORMANCE OF CARNATION (*DIANTHUS CARYOPHYLLUS* LINN.) CULTIVARS UNDER STEEL FRAME (MEDIUM COST) AND WOODEN FRAME (LOW COST) POLYHOUSES

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ABSTRACT
Performance of four cultivars of carnation namely Gaudina, Dona, Bizet and Malaga were tried under two different environments *viz.*, wooden frame structure and steel frame structure at Ooty, The Nilgiris. The performance of the cultivars under two different growing structures were compared based on the vegetative, yield and quality parameters of the crop. Among the cultivars, Gaudina under naturally ventilated aerodynamic steel frame structure polyhouse showed better performance when compared with wooden frame structure. The longevity and performance of crop inside the steel frame structure proved better.

KEYWORDS - carnation, steel frame structure, wooden frame structure, cultivars**.**

INTRODUCTION

Carnation (*Dianthus caryophyllus* Linn.) is one of the leading cut flower grown in the hills of the Nilgiris and Kodaikanal of Tamil Nadu. The cultivation of carnation crop under polyhouse is gradually increasing and the flowers produced is of international quality. Carnation is normally grown under naturally ventilated aerodynamic structures made of steel frame and the initial establishment cost for this type of greenhouses is comparatively higher. An alternative system with wooden frame structure made of locally available materials such as casuarinas and bamboo has been established for an experimental study in comparison with steel frame structure.

Many recent cultivars are being introduced from time to time by commercial growers in addition to the existing cultivars. So this study was aimed to compare the performance of the cultivars under steel frame and wooden frame polyhouses.

MATERIAL AND METHODS

The present study was conducted at the Woodhouse farm, Horticultural Research Station, Ooty of Tamil Nadu Agricultural University during 2010 - 2012. The experiment was laid out in factorial randomized block design (FRBD) with four cultivars and two different growing environmental conditions as steel frame and wooden frame structure. Totally eight treatment combinations were tried with three replications. The total size of each polyhouse was 200 sq.m. The steel frame structure was made of ISI 'B' class galvanized ion with tubular structures and the side screens are covered by using insect proof nets with 40 microns size and side ventilations by white colour shade nets. The polyhouse covering material was polyethylene film with 200 microns UV stabilized clear sheet and it is covered by fixing with GI locking profile with zigzag springs and side screens. The height of the structure was 5 m, gutter height 3.75 m, gutter width 0.45 m, side screen opening 2 m. The wooden frame polyhouse was made of casuarina poles with wooden rafter and purlins. The height of the wooden frame structure polyhouse was 4 m, gutter height 0.45 m gutter width 0.45 m, side screen opening with 1.5 m, insect screen with 40 microns. Four commercial cultivars of carnation *viz.*, Gaudina, Dona, Bizet, Malaga were chosen for evaluation under two different growing structures. Among these, Gaudina a popular standard cultivar was used as check. Well established rooted cuttings of the varieties were planted at a spacing of 15 x 15 cm. The recommended package of practices were followed for both polyhouse structures right from soil fumigation, bed preparation, fertigation, pinching, netting, disbudding, harvesting and post harvest management practices.

The observations on vegetative parameters *viz.*, plant height (cm), number of leaves per plant, number of laterals per plant, internodal length (cm) and floral parameters *viz.*, days taken for flower bud appearance and opening, flower yield per m^2, duration of flowering (days), flower stalk length (cm) and flower bud circumference (cm), calyx splitting (%), leaf spot incidence were recorded for one flush of flowering.

RESULTS & DISCUSSION

The performance of different carnation cultivars and the growing structures exhibited significant influence on the growth and flowering parameters. The vegetative parameters with plant height (69.50 cm), number of leaves per plant (170.00), number of laterals per plant (6.20) and internodal length (4.90 cm) in cv. Gaudina performed was better under steel frame structure when compared with cultivars grown under both steel frame and wooden frame structure. The cultivar Dona showed minimum plant height (63.60 cm) whereas minimum number of leaves was observed in Malaga (160). Minimum number of

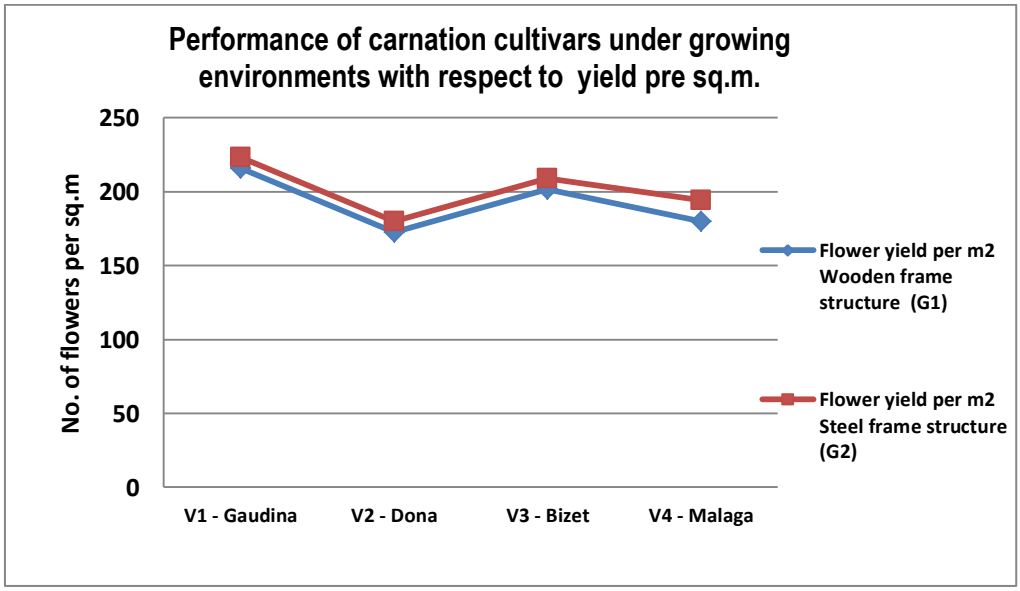
laterals per plant (4.80) and internodal length (3.90 cm) was recorded in cultivar Dona. This might be due to the structure of greenhouse which helps in the circulation of air movement and the climatic factors maintained inside the aerodynamic greenhouse when compared with wooden frame structure. The findings are in concurrence with the earlier findings of Mukherjee (1991) and Palai (2009) in chrysanthemum. (Table 1).

TABLE 1: Effect of growing environment on growth parameters of different cultivars of carnation

Cultivars	Plant height (cm)		No. of leaves per plant		No. of laterals per plant		Internodal length (cm)	
	Wooden frame structure (G1)	Steel frame structure (G2)	Wooden frame structure (G1)	Steel frame structure (G2)	Wooden frame structure (G1)	Steel frame structure (G2)	Wooden frame structure (G1)	Steel frame structure (G2)
V1 - Gaudina	68.00	69.50	168.00	170.00	6.00	6.20	4.40	4.90
V2 - Dona	63.60	67.70	164.00	164.00	4.80	5.00	3.90	4.10
V3 - Bizet	66.10	68.00	164.00	168.00	5.60	5.80	4.20	4.50
V4 - Malaga	64.30	65.90	160.00	162.00	5.00	5.40	4.00	4.15
Mean	65.50	67.78	164.00	166.00	5.35	5.60	4.13	4.41

	CD at 5 %	CD at 5 %	CD at 5 %	CD at 5 %
Cultivar	1.893	6.524	0.272	0.200
Growing environment	2.677	4.613	0.192	0.141
Interaction	3.786	9.226	0.385	0.282

The yield and quality characters observed in the cultivars grown under steel frame structured polyhouse conditions was better as compared to that of cultivars grown under wooden frame structured polyhouse. Among the cultivars, the day taken for visible flower bud appearance was earlier in Gaudina (140.00 days) followed by Bizet (143.00 days). The days taken for flower bud opening (192.00 days), yield per m^2 (223.20), duration of flowering (90.50 days) was better in the cultivar Gaudina grown under steel frame structure.



The cultivar Dona grown under wooden frame structure recorded poor performance in yield attributing characters with delayed flower bud appearance (152.00 days), flower bud opening (205.00 days) and flower yield per m^2 (172.80) and minimum days for duration of flowering (82.00 days). Similarly for quality characters, cultivar Gaudina performed better with flower stalk length of 65.00 cm and the cultivar Malaga with flower bud circumference of 5.80 cm, Bizet exhibited minimum calyx splitting (2.10 %) under steel frame structured polyhouse. The cultivar Gaudina and Bizet showed nil per cent of leaf spot incidence when compared to others. Similarly in wooden frame structured polyhouse, bizet showed minimum stalk length (61.20 cm), minimum calyx split incidence (2.1 %) and flower bud circumference (4.5 cm) whereas nil per cent disease incidence was observed in Gaudina and Bizet. This might be due to the fact that the plant growth, yield and quality parameters in the steel frame structured polyhouse was better than the wooden frame structured polyhouse and this is due to the availability of more amount of carbon dioxide and light which provides more food material as compared with wooden frame structure.

TABLE 2: Effect of growing environment on yield parameters of different cultivars of carnation

Cultivars	Days taken for flower bud appearance		Flower bud opening (days)		Flower yield per m^2		Duration of flowering (days)	
	Wooden frame structure (G1)	Steel frame structure (G2)	Wooden frame structure (G1)	Steel frame structure (G2)	Wooden frame structure (G1)	Steel frame structure (G2)	Wooden frame structure (G1)	Steel frame structure (G2)
V1 - Gaudina	142.00	140.00	195.00	192.00	216.00	223.20	88.00	90.50
V2 - Dona	152.00	147.00	205.00	200.00	172.80	180.00	89.00	88.00
V3 - Bizet	145.00	143.00	199.00	197.00	201.60	208.80	85.00	90.00
V4 - Malaga	147.00	144.00	201.00	198.00	180.00	194.40	82.00	89.00
Mean	146.50	143.50	200.00	196.75	192.60	201.60	86.00	89.38

	CD at 5 %	CD at 5 %	CD at 5 %	CD at 5 %
Cultivar	5.118	7.053	9.801	3.425
Growing environment	3.619	4.987	6.930	2.422
Interaction	7.238	9.975	13.861	4.844

TABLE 3: Effect of growing environment on quality parameters of different cultivars of carnation

Cultivars	Flower stalk length (cm)		Flower bud circumference (cm)		Calyx splitting (%)		Per cent Disease Incidence			
	Wooden frame structure (G1)	Steel frame structure (G2)	Wooden frame structure (G1)	Steel frame structure (G2)	Wooden frame structure (G1)	Steel frame structure (G2)	Wooden frame structure (G1)		Steel frame structure (G2)	
							Leaves infected (%)	Disease scale	Leaves infected (%)	Disease scale
V1 - Gaudina	63.00	65.00	4.80	5.20	3.75	3.50	6.45	2	0	0
V2 - Dona	61.80	63.40	4.50	4.80	3.40	3.20	31.01	7	10	3
V3 - Bizet	61.20	63.50	4.60	4.75	2.00	2.10	6.25	2	0	0
V4 - Malaga	62.00	64.00	5.50	5.80	4.80	4.50	10.18	5	3	3
Mean	62.00	63.98	4.85	5.14	3.49	3.33	13.47		3.25	

	CD at 5 %	CD at 5 %	CD at 5 %	CD at 5 %
Cultivar	2.366	0.166	0.172	1.858
Growing environment	1.673	0.117	0.121	1.313
Interaction	3.346	0.235	0.243	2.627

This resulted in better growth, yield and quality characters in steel frame polyhouses irrespective of the cultivars evaluated. However, the cultivar Gaudina with red colour having higher stalk length (65.00 cm) and yield per m^2 (223.30) was found to be the best irrespective of the growing conditions.

CONCLUSION

The results of the study led to the inference that aerodynamic with steel frame structure having side ventilations with insect proof nets and the cultivar Gaudina will have a better vegetative, yield and quality parameters compared to wooden structures.

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