



OWC 2020 Paper Submission - Science Forum

Topic 1 - Ecological approaches to systems' health

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YIELD AND QUALITY EVALUATION OF CAPSICUM GENOTYPE UNDER MESH NET (UMN) AND OPEN FIELD AT ORGANICALLY MANAGED SOIL IN BANGLADESH

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Abstract: The study has been carried out at organically converted field under olericulture division of HRC, BARI Gazipur during November 2017 to March 2018 to find out suitable genotypes in terms of horticultural traits and nutritional quality along with growing methods. The two factor experiment was set in a split design where net protection was under main plot and eight capsicum genotypes including 2 released varieties were grown in the sub plot with three replication. Number of fruits per plant varied significantly and the highest number of fruits were yielded by CA0034-3 (17) followed by CA 0036 (16) and CA 0034 (15) under net condition. The lowest numbers of fruits were produced by genotypes BARI mistimorich 1 (6) at UMN. Single fruit wt also differed significantly among the genotypes and also had influenced by net. BARI mistimorich 1 and 2 produced the weightiest fruits (124 and 112 g) at UMN while the same varieties produced the lightest fruits (81.2 and 51.8 g) UMN is a good technology to produce capsicum. BARI mistimorich 1 and 2 are the two varieties released by BARI for conventional farming. In this study it was concluded that the released variety showed good growth along with other genotypes CA 0031 and CA0036 in terms of lycopene and β carotene content.

Introduction: Capsicum is a high value and highly nutritive vegetables in Bangladesh getting popular among the consumers and well as growers. Peppers, Capsicum spp., are grown worldwide for vegetable, and is a significant source of vitamins A. Organic production of bell pepper is entirely new and seeds are imported mostly from abroad developed by multi national company. High illumination, low temperature and mite are the main constraint for growing bell pepper in Bangladesh. Shade nets are commonly used to modify the crop microenvironment with the goal of improving crop production (Castellano et al., 2008), shading increases plant growth and yield (Rylski and Spigelman, 1986), reduces water requirements, and increases irrigation water use efficiency in bell pepper. Effects of shade level on crop microenvironment, plant growth, leaf gas exchange, and leaf mineral nutrient content in bell pepper have been reported. BARI has developed to variety along with technology for conventional farming. But the technology yet tested for organic

condition. Moreover, suitable variety is required along with nutritional benefits. In order find suitable variety and growing conditions present has been carried out.

Material and methods: The study has been carried out at organically converted field under olericulture division of HRC, BARI Gazipur during November 2017 to March 2018 to find out suitable genotypes in terms of horticultural traits and nutritional quality along with growing methods. The two factor experiment was set in a split design where net protection was under main plot and eight capsicum genotypes including 2 released varieties were grown in the sub plot with three replication. Seedlings were raised in a 500 ml pots filled in standard organic media (50% of each well decomposed cow dung and organic soil). The plot fertilized with organic input at the rate 15 t /ha well decomposed cowdung. The half amounts of cow dung were applied during land preparation. After final preparation of land a 1.2 m wide and 18 m length bed was raised apart from 50 cm drain in between two beds. Fifty percent of remaining half cowdung was incorporated in the bed. Then pits were dug with 50 x 50 cm distance and remaining cow dung and 100 g of BAOFER fertilized the each pit. Thirty five days old seedling were planted in each pit followed by microbial fertilizer contained water. Meshes net (60 mesh/ inch) were installed in the net protected treatment. Data were recorded on Plant height (cm), Days to 50% flowering (day), Crop duration, No. of fruits/plant, Single fruit wt. (g), Fruit length (cm), Fruit breadth (cm), °brix, Yield/plant (g). Color (L, a*, b*) were measure by using a Chroma meter (Cr 400, Minolta, Japan) and Lycopene and β - carotene were calculated according to (Tilahun *et al*, 2018). SPAD was measured by a SPAD 502 meter (Minolta, Japan). Data were analyzed by R 3.5.1 version (CRAN).

Results: The yield and quality parameters were presented at table 1 and figure 1-4 and observed statistically significant variation most of the cases. It was revealed that plant height of genotypes varied significantly under net and open condition. Capsicum is sensitive to temperature and prone to red mite influences the yield and yield contributing characters in Bangladesh. Number of fruits per plant varied significantly and the highest number of fruits were yielded by CA0034-3 (17) followed by CA 0036 (16) and CA 0034 (15) under net condition. The lowest number of fruits was produced by genotypes BARI mistimorich 1 (6) at UMN. Single fruit wt also differed significantly among the genotypes and also had influenced by net. BARI mistimorich 1 and 2 produced the weightiest fruits (124 and 112 g) at UMN while the same varieties produced the lightest fruits (81.2 and 51.8 g). Fruit size differed by net and open condition across the genotypes. TSS was measured by a brix meter and observed variation ranges from 9-11. Fruit yield per plant significantly varied among the genotypes and affected by net. The highest amount of fruit was produced by BARI mistimorich 2 followed by BARI mistimorich 1 and CA 0036. As the yield contributing characters were influenced by net protection and it was observed that the fruit yield around 40 percent. Lycopene content of fruit at ripened stage in the studied genotypes varied significantly (Fig.1). Except BARI mistimorich 2 all the genotypes contained lycopene ranges 20-26 mg/kg and the lowest was measured at BARI mistimorich 2 which is yellow in color. Similar trend was observed for β carotene. There are interesting finds also recorded that at UMN condition both Lycopene and β carotene was higher irrespective genotype. Chlorophyll is the main isolates producer, which might be deposited in fruit and distributed to plant for growth and development. In this study it was observed that at UMN condition the amount of chlorophyll was higher which contributed for higher yield.

Table 1: Yield and yield contributing characters of capsicum genotypes under organic practices

Genotypes	Plant height (cm)		Days to 50% flowering (days)		Crop duration (days)		No. of fruits / plant		Single fruit wt. (g)		Fruit length (cm)		Fruit breadth (cm)		TSS(°brix)		Yield / plant (g)	
	UMN	Open	UMN	Open	UMN	UMN	Open	UMN	Open	UMN	Open	UMN	Open	UMN	Open	UMN	Open	UMN
BM 1	55.0	34.3	65.7	62.1	10.5	7.76	4.90	7.32	4.92	9.76	9.68	688.89	233.25	92	5.56	3.00	124.00	81.20
BM 2	65.2	43.7	65.7	59.2	11.0	7.76	4.20	7.22	5.22	9.68	9.68	894.38	214.67	95	7.50	3.83	112.17	51.80
CA0020	80.2	55.1	71.3	67.4	10.1	7.13	6.52	5.42	3.52	9.74	9.80	574.00	162.22	69	7.00	3.63	82.00	44.60
CA0025	85.0	59.5	74.6	56.8	10.5	9.30	6.40	3.58	2.76	9.88	10.32	458.11	231.71	97	13.78	11.17	32.60	20.60
CA 0031	56.8	45.9	69.0	60.5	10.9	7.80	5.88	6.74	3.82	9.92	9.32	637.66	212.63	78	6.63	3.50	93.00	60.75
CA0034	112.3	79.9	75.0	70.2	12.0	8.78	5.28	2.34	1.62	10.20	11.00	302.94	237.25	100	14.78	10.00	20.20	17.80
CA0034-3	110.5	95.5	62.0	71.4	10.7	12.44	6.78	1.86	1.24	10.74	10.64	331.50	282.75	96	17.00	15.50	19.60	13.60
CA0036	72.2	56.7	70.0	67.0	10.0	8.30	4.90	4.50	3.10	10.28	9.72	638.25	325.38	83	15.86	9.50	40.25	32.40
Level of sig.	*		ns		**		**		*		*		*		ns		**	
LSD	11.12		7.89		5.67		2.21		8.36		1.31		0.69		3.46		79.12	

BM = BARI Mistimorich, UMN= under mesh net

Discussion: There are interesting finds also recorded that at UMN condition both Lycopene and β carotene was lesser irrespective genotype. Chlorophyll is the main isolates producer, which might be deposited in fruit and distributed to plant for growth and development. In this study it was observed that at UMN condition the amount of chlorophyll was higher which contributed for higher yield. Diaz-Perez, 2014 also observed the similar effects of shading in capsicum. Capsicum is a high value crop in Bangladesh is getting popular among the city elite community. UMN is a good technology to produce capsicum. BARI mistimorich 1 and 2 are the two varieties released by BARI for conventional farming. In this study it was concluded that the released varieties showed good growth at organic condition along with other genotypes CA 0031 and CA0036 in terms of lycopene and β carotene content.

References: Castellano, S, Mugnozza GS, Russo G, Briassoulis D, Mistriotis A, Hemming S, and Waaijenberg D (2008). Plastics net in agriculture: A general review of types and applications. *Appl. Eng. Agr.* 24:799–808.

Diaz-Perez, J.C. (2015): Bell Pepper (*Capsicum annum* L.) Crop as Affected by Shade Level: Fruit Yield, Quality, and Postharvest Attributes, and Incidence of Phytophthora Blight (caused by *Phytophthora capsici* Leon.). *HortScience* 49(7):891–900.

Rylski I and Spigelman M (1986): Effect of shading on plant development, yield and fruit quality of sweet pepper grown under conditions of high temperature and radiation. *Sci. Hort.* 29:31–35.

Tilahuna S, Parka DS , Seo MH, Hwangb IG, Kima SH, Choia HR, Jeonga CS (2018): Prediction of lycopene and β -carotene in tomatoes by portable chromameter and VIS/NIR spectra, *Postharvest Biology and Technology* 136, 50–56.

Image:

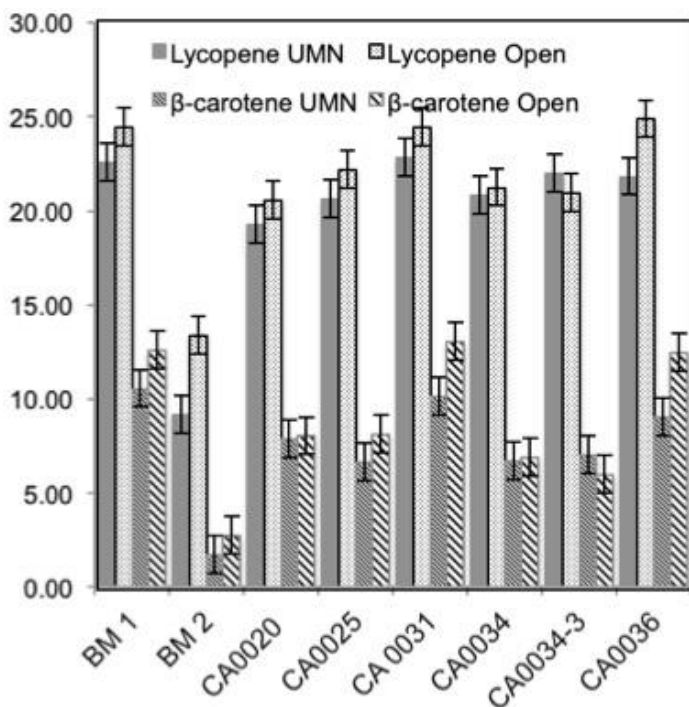


Fig. 1 Nutritional status (Lycopene and β carotene) of capsicum fruits at UMN and open field conditions

Image 2:

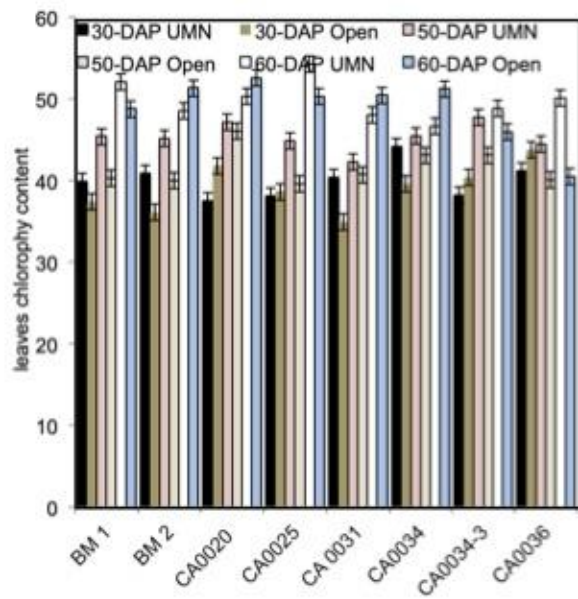


Fig.2. Leaves efficiency to produce food using sunlight through chlorophyll measured by SPAD meter

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