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Original Research Article

In-Situ Evaluation of Year-Round Pummelo Germplasm under Agro Ecological Conditions of South East Part of Bangladesh

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Abstract: The study has been conducted at farmer field under closed supervision of the Hill Agricultural Research Station, BARI, Khagrachari during the year 2019-2020, 2020-2021 & 2021-2022. One year round pummelo germplasm (CG Kha 001) was selected for the evaluation along with a seasonal pummelo. Mainly year round bearing occurred in the germplasm. Maximum numbers of mature (40) and immature (58) fruits were found in the month of October and May respectively. Average fruit weight was 1.50 kg. The edible portion was obtained in year round pummelo (37.35%) and the highest TSS (9.86%). The total number of fruits harvest per year (218) was collected from CG Kha 001. Consideration of fruit characteristics, edible quality, TSS, percent edible portion and yield potentialities, the germplasm CG Kha 001 was found promising.

Keywords: Year Round Pummelo, Germplasm, Mature, Immature, Quality and Yield Potentialities.

INTRODUCTION

Pummelo is one of the important citrus fruits grown and consume all over Bangladesh. Great variation exists in the South East part of Bangladesh. Several seasonal cultivars are produced commercially in different part of Bangladesh. The production of pummelo in the fiscal year 2021-22 is about 7.44% more than sweet orange in Bangladesh (BBS, 2022). It is originated from the island east of Malaya archipelago including Fiji or in China (Bose *et al.*, 2001). According to the Global Agricultural Information Network Report (2018) the largest pomelo producing regions are Fujian, Guangdong, Guangxi, Sichuan, Hunan, Jiangxi, Zhejiang, and Yunnan of Chaina. It contains high level of antioxidants, vitamin C, naringenin, naringin and lycopene which may offer various health benefits (*K. Makynen et al., 2013).* A wide genetic variation of pummelo germplasm was observed in the Chattogram hill tracts of Bangladesh. But most of them are one season bearing habit. Our research carried out high yielding year round pummelo germplasm which help to production and availability throughout the year.

MATERIALS AND METHODS

A year round pummelo germplasm (CG Kha 001) and a check germplasm (CG Kha 002) were selected for the study at farmer field of Khagrachari hill district. The age of the plants was about 14 years. The manures and fertilizers were applied at the rate of Cowdung 15kg, Urea 500g, TSP 400g and MOP 450g per plant. All the nutrients were applied in two equal installments before and after rainy season. Pegging method applied for fertilizer application to reduce soil expose. Irrigation was given at 15 days interval during dry season. Year round flowering was observed in CG Kha 001 and mature fruits harvest in every month. Number of mature and immature fruits were collected every month. Fully mature fruits were harvested from the plant and data on qualitative and quantitative parameters were recorded after ripening of the fruits and the mean data have been presented. Important qualitative characteristics such as bitterness, pilling quality, flesh colour, flesh texture, juiciness and organoleptic taste were recorded each harvest time. Total soluble solids content of fully mature fruits was recorded using Digital Hand Refractometer. Three years pooled data were used

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to evaluate the germplasm. Three years pooled data on yield, yield components, fruit characteristics and disease and pest reaction of pummelo germplasm are given in figure1-2 & table 1-4.

RESULTS AND DISCUSSION

Some qualitative variations were found in between two germplasm in case of flesh colour, texture, juiciness, organoleptic taste and peeling quality. CG Kha 001 was soft, juicy and very sweet with pink flesh colour. No Bitterness was found in CG Kha 001 and easy to peel which is desirable for pummelo.

Table 1: Qualitative characteristics of pummelo germplasm

Acc.no.	Flesh colour	Flesh texture	Juiciness	Organoleptic taste	Bitterness	Peeling quality
CG Kha 001	Pink	Soft	Juicy	Very sweet	Nil	Easy
CG Kha 002	White	Crispy	Medium	Sweet	Nil	Medium

In CG Kha 001 mature Fruits were found in every month year whereas CG Kha 002 was found in only October month in last three years. Both germplasm produce maximum mature fruits in October month. Among the twelve-month lowest mature fruits found in the month of February in case of CG Kha 001. Year-round immature fruits bearing were seen on CG Kha 001, on the other hand CG Kha 002 showed seasonal immature fruits.

Table 2: Month wise three years mean data on mature and immature fruits

Month	CG Kha 001		CG Kha 002 (Control)	
	Number of mature Fruits/plant	Number of immature Fruits/plant	Number of mature Fruits/plant	Number of immature Fruits/plant
July	18	39.6	0	53
August	16	49	0	49
September	31	20.6	0	44
October	40	46.3	42	0
November	15.67	29.3	0	0
December	10	14.6	0	0
January	10.67	52.3	0	0
February	9.67	33	0	0
March	30.33	34.3	0	0
April	16	56.3	0	0
May	9.33	58	0	70.33
June	11.13	39.6	0	60.33
Range	9.67-40	14.6-58	o-42	44-70.33

Significant differences were observed in harvesting. Total fruit harvest per year was higher in CG Kha 001 considering CG Kha 002 (figure. 1). From figure 2 showed different bearing situation in CG Kha 001. Flowering, immature fruits and mature fruits were appeared at time in CG Kha 001 (figure 2a). Internal colour and segments of CG Kha 001 also appeared in figure 2b.

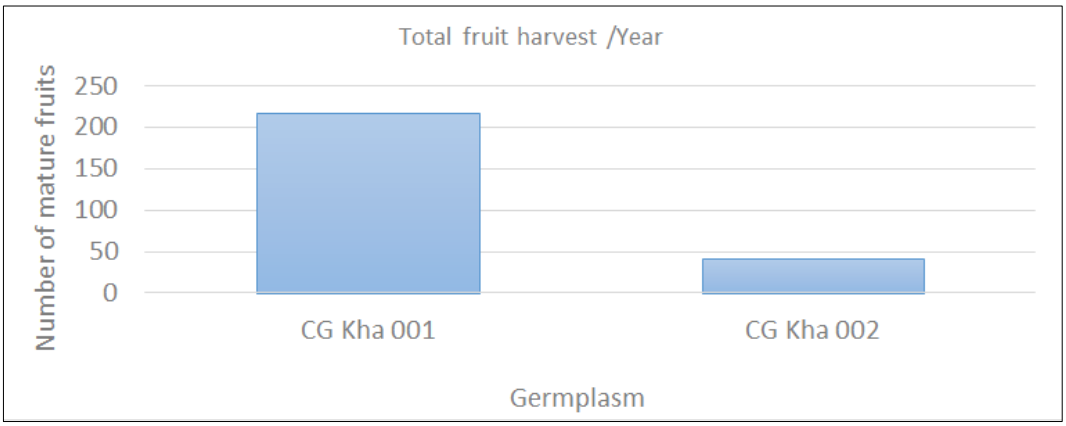

Figure 1: Total mature fruit harvest per year in two germplasm

Figure 2: Field view & internal view of CG Kha 001

Average fruit weight1.44kg and 1.17kg were found in CG Kha 001and CG Kha 002 respectively. CG Kha 001 showed more fruit weight than CG Kha 002. Maximum 1.50kg fruit weight was found in CG Kha 001 in the year of 2021-22. Mitra *et al*., (2011) obtained more wide range of fruit weight (570 – 2010 g), but studied by Ara *et al*., (2008) and Samarasinghe (2005) the variation of fruit weight was more or less similar.

Average fruit segment number per fruit was 12.94 and 12.87 CG Kha 001and CG Kha 002 respectively. Flesh weight 536.5g from the evaluated line (CG Kha 001) and - from the check variety (CG Kha 002). Among the three-year maximum edible portion was obtained 43.07% from year round line and 37.35% was found from control. Average TSS was comparatively high (9.86%) in evaluated lines (CG Kha001) compared to (9.33%) the check variety (CG Kha 002).

Table 3: Quantitative and Qualitative characteristics of pummelo germplasm at Khagrachari

	CG Kha 001					CG Kha 002				
Year	**fruit wt. (kg)**	**Segments/fruit (No)**	**Flesh wt. (g)**	**Edible portion (%)**	**TSS (%)**	**fruit wt. (kg)**	**Segments/fruit (No)**	**Flesh wt. (g)**	**Edible portion (%)**	**TSS (%)**
2019-20	1.35	12.83	525.9	41.12	9.3	1.15	13.17	511	39.29	9.10
2020-21	1.47	12.83	533.4	42.56	9.95	1.25	13.20	532	36.54	9.1
2021-22	1.50	13.17	550.2	45.54	10.34	1.10	12.25	501	36.22	9.8
Average	1.44	12.94	536.5	43.07	9.86	1.17	12.87	514.66	37.35	9.33

No major disease and insect pest incidence was found during research. The CG Kha 001 is less susceptible to insect, pests and diseases.

Table 4: Disease and insect pest incidence of pummelo germplasm at Khagrachari

Germplasm	Disease incidence	Pest infestation
CG Kha 001	Shooty mold	Leaf miner
CG Kha 002	Shooty mold	Lemon butterfly, Leaf miner

CONCLUSION

The number of mature fruits per month, fruit weight, edible portion (%) and TSS (%) were found satisfactory. Fruit flesh of the line CG Kha 001 was soft, juicy, bitter less and very sweet in organoleptic taste. Therefore, CG Kha 001 was found promising for year-round cultivation to availability of pummelo.

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