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Studies on different flesh coloured watermelon (*Citrullus lanatus* Thunb.) genotypes for variation in yield attributes

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Abstract
The field experiment was carried out at the experimental block of Department of Vegetable Science, College of Horticulture, Anantharajupeta, Annamayya district, Andhra Pradesh during *Spring Summer* season of 2023 to assess performance of seventeen different flesh colored watermelon genotypes for variation in yield attributes. The results of the experiment revealed significant variations among the 17 different watermelon genotypes with respect to their yield characteristics. Specifically, the genotype GK-2 demonstrated superior performance in terms of sex ratio and the number of fruits produced per plant. In terms of fresh weight, Arka Akash exhibited the highest, followed closely by Crimson Sweet. Furthermore, the maximum yield per plant was recorded in Sugar Baby, followed by Arka Shyama and Arka Akash. Lastly, the genotype AHW-65 displayed a commendable performance in terms of days to fruit harvest.

Keywords: Flesh color, *Citrullus lanatus*, yield attributes, genotypes

Introduction
Watermelon (*Citrullus lanatus* (Thunb.)) is a warm-season crop that belongs to the Cucurbitaceae family. It is primarily cultivated for its fresh juice and sweet flesh, with the fruit being valued for its edible endocarp, rind, seeds, and seed oil. The leading watermelon-producing states in India include Uttar Pradesh, Andhra Pradesh, Tamil Nadu, Karnataka, Orissa, West Bengal, Madhya Pradesh, Haryana, Maharashtra, and Jharkhand. In Andhra Pradesh, Anantapur district stands out as the top producer, followed by Chittoor, Prakasam, and Kadapa. The flesh of the watermelon is soft and spongy, displaying a range of colors such as reddish, pink, yellow, or yellowish-white.

Watermelon is renowned for its composition, primarily consisting of 91% water and 6% sugar content. It also serves as a source of essential nutrients like citrulline, Vitamin C, potassium, and the antioxidant lycopene. Furthermore, this fruit contains a spectrum of vital nutrients, including nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), iron (Fe), manganese (Mn), copper (Cu), and zinc (Zn). Additionally, watermelon boasts an array of phytochemical compounds, such as sugars (fructose, sucrose, and glucose), amino acids (citrulline and arginine), organic acids (citric and malic), and carotenoids (lycopene, phytoene, prolycopene, violaxanthin, neoxanthin, lutein, and β-carotene). Apart from the fruit itself, watermelon seeds also possess noteworthy nutritional parameters, including 31.9% protein, 4.4% carbohydrates, 57.1% fat, 8.2% fiber, 6.2% ash, as well as 130 mg calcium, 456 mg phosphorus, and 7.5 mg iron content. These seeds are a valuable source of essential amino acids like leucine, isoleucine, tryptophan, and valine (Razavi *et al.*, 2006) [9]. In the context of plant breeding programs, it is crucial to maintain ample genetic diversity to develop new watermelon varieties that prioritize factors such as high productivity, quality, appearance traits like shape and color, and resilience against both biotic and abiotic factors (Wehner *et al.*, 2001) [13].

Therefore, the assessment of various watermelon genotypes with different flesh colors becomes of paramount significance as it facilitates the identification of cultivars possessing favorable yield and quality characteristics. The objective of this study was to investigate the different flesh colored watermelon genotypes for variation in yield and yield attributes.

Materials and Methods

The present investigation was carried out at the experimental block of Department of Vegetable Science, College of Horticulture, Anantharajupeta, Annamayya district, Andhra Pradesh during *Spring-Summer* season of 2023. The experiment was laid in RBD and replicated three times. The treatments comprised 17 different flesh colored watermelon genotypes**.** Eight genotypes were red flesh color *viz*., Arka Manik, Crimson Sweet, Arka Shyama, Arka Akash, Sugar Baby, AHW-19, AHW-65, Arka Muthu, three orange flesh color *viz*., Tai Orange, Honeymoon, Orange Delight, four as yellow flesh color *viz*., Tai Yellow, Swarna, Durgapur Kesar, King Yellow and two were white flesh color *viz*., GK-2, CAZJK-1 genotypes. Observations were made on various attributes, including sex ratio, fruit weight, number of fruits per plant, yield per plant, days to fruit harvest. To facilitate this, five plants were randomly chosen from each replication for data collection.

Results and Discussion

Significant variations existed among the 17 different flesh colored watermelon genotypes with regards to yield characters (Table 1).

Sex ratio (%)

A lower sex ratio value is advantageous for achieving higher production. Among the studied genotypes, AHW-19 exhibited the highest sex ratio at 17.22%, followed closely by AHW-65 at 13.70%. In contrast, the lowest sex ratio was observed in GK-2 (6.22) and Sugar Baby (7.76). These findings align with previous research by Mohanta *et al.* (2016) [7], Anburani *et al.* (2019) [2] in watermelon, and Indraja *et al.* (2020) [5] in muskmelon. It's worth noting that the variation in sex ratio observed in this study may be influenced by environmental factors in addition to the inherent genetic characteristics of the plant.

Fruit weight (kg)

Regarding fruit weight, Arka Akash exhibited the highest fruit weight (3.65), followed by Sugar Baby (3.36), Crimson Sweet (3.56). The lowest values were observed in the GK-2 genotype (1.50). Results are in confirmation with the findings of Anburani *et al.* (2019) [2], Amzeri *et al.* (2021) [1] in watermelon and Indraja *et al.* (2020) [5] in muskmelon.

Number of fruits per plant

The quantity of fruits per plant stands as a crucial yield characteristic directly impacting production. GK-2 exhibited the highest number of fruits per plant (4.17) followed by Sugar Baby (3.11), Arka Shyama (2.95), Tai Orange (2.84), and Tai Yellow (2.82). Conversely, Swarna displayed the lowest number of fruits per plant at 1.48. These results align with previous research conducted by Mohanta *et al.* (2016) [7], Choudhary *et al.* (2012) [4] in watermelon, as well as Venkatesh *et al.* (2016) [14] and Janghel *et al.* (2018) [6] in muskmelon.

Yield per plant (kg)

The genotype Sugar Baby achieved the highest fruit yield per plant (10.64 kg) followed by Arka Shyama (7.36 kg), Arka Akash (6.98 kg). On the other hand, Swarna had the lowest fruit yield per plant at 3.06 kg followed by Arka Muthu (3.11 kg). Notably, fruit weight at the phenotypic level had the most substantial direct impact on fruit yield per plant, followed by the number of fruits per plant, as reported by Choudhary in 2012 [4]. These findings are consistent with similar results reported by Choudhary *et al.* (2012) [4] and Mohanta *et al.* (2016) [7] in watermelon, as well as Venkatesan *et al.* (2016) [14] in muskmelon.

Days to fruit harvest

A lower mean value for the days to fruit harvest is preferred. In this regard, the genotype Swarna required a longer duration for fruit harvest, taking approximately 82.83 days followed by Arka Akash (78.27). On the contrary, the genotype AHW-65 exhibited the shortest duration for days to fruit harvest (72.44). These results align with previous findings reported by Rolania *et al.* (2004) [11], Reddy *et al.* (2017) [10], Nisha *et al.* (2018) [8], and Venkatesh *et al.* (2016) [14] in muskmelon.

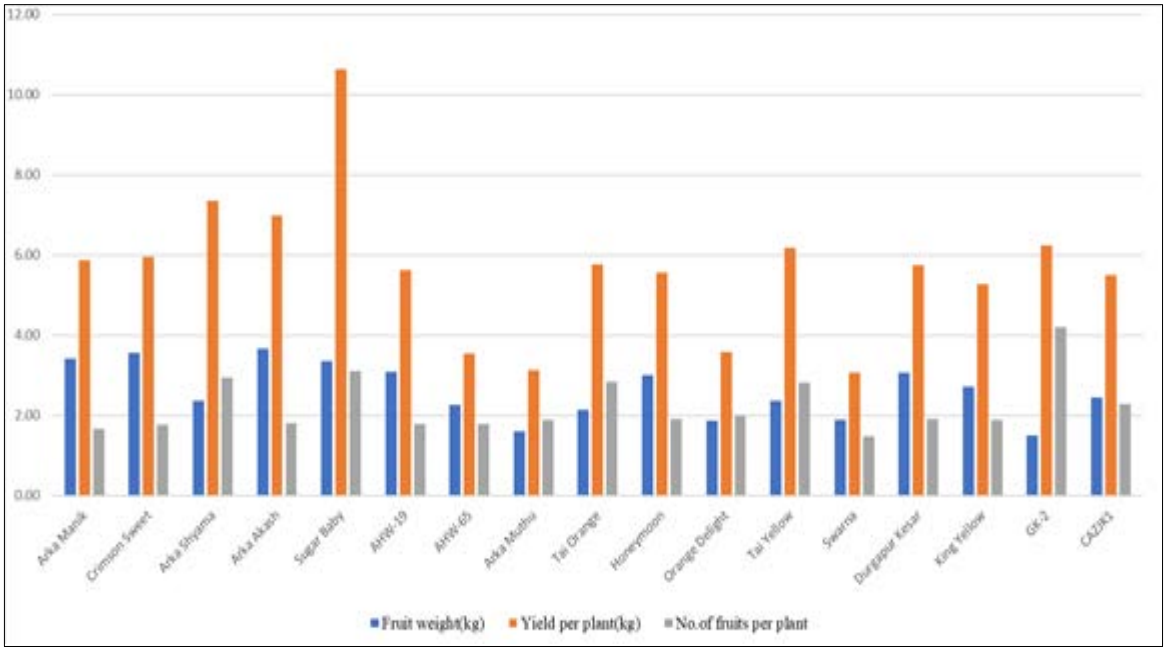

Fig 1: Per se performance of different flesh coloured watermelon genotypes for yield and yield attributing traits

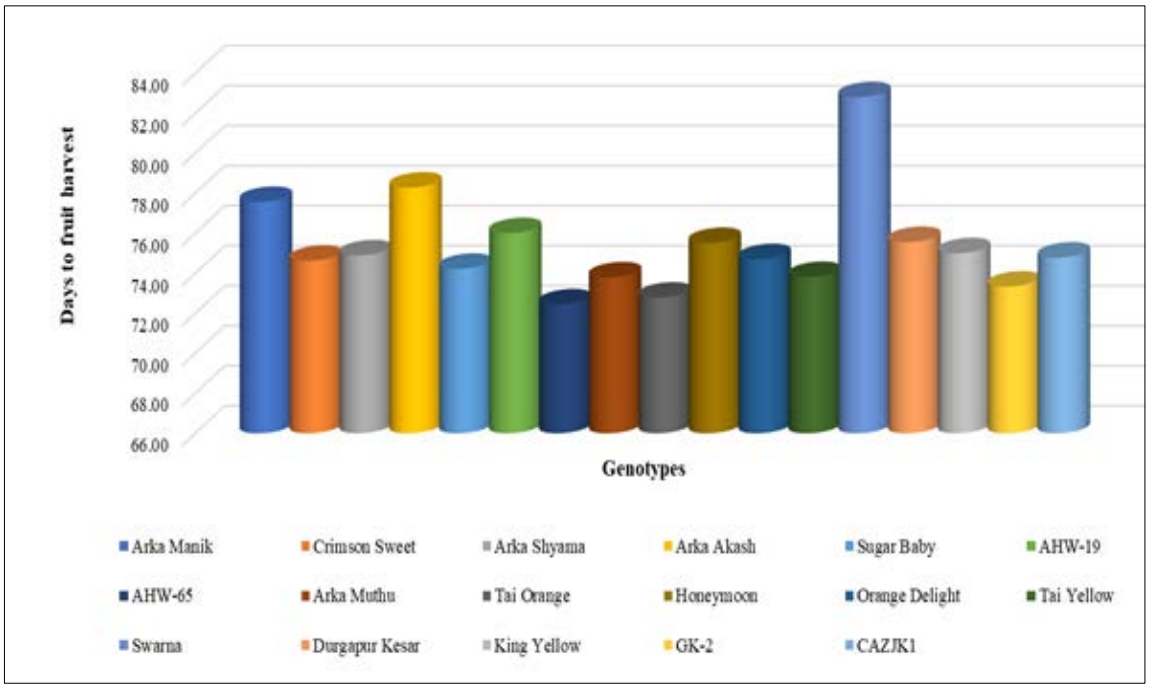

Fig 2: Per se performance of different flesh colored watermelon genotypes for days to fruit harvest

Table 1: Per se performance of different flesh coloured watermelon genotypes for yield attributes

S. No	Flesh colour	Genotypes	Sex ratio (%)	Fruit weight (kg)	Yield per plant (kg)	No. of fruits per plant	Days to fruit harvest
1	Red	Arka Manik	12.56	3.41	5.88	1.66	77.55
2		Crimson Sweet	10.41	3.56	5.96	1.76	74.62
3		Arka Shyama	8.42	2.35	7.36	2.95	74.88
4		Arka Akash	9.00	3.65	6.98	1.80	78.27
5		Sugar Baby	7.76	3.36	10.64	3.11	74.22
6		AHW-19	17.22	3.08	5.63	1.78	76
7		AHW-65	13.7	2.25	3.55	1.79	72.44
8		Arka Muthu	11.52	1.59	3.11	1.9	73.78
9	Orange	Tai Orange	8.30	2.14	5.77	2.84	72.77
10		Honeymoon	8.88	3.01	5.77	1.92	75.51
11		Orange Delight	10.50	1.87	3.58	1.98	74.7
12	Yellow	Tai Yellow	8.11	2.37	6.18	2.822	73.81
13		Swarna	13.51	1.88	3.06	1.48	82.83
14		Durgapur Kesar	11.32	3.06	5.74	1.91	75.55
15		King Yellow	8.83	2.71	5.26	1.88	75
16	White	GK-2	6.22	1.5	6.25	4.17	73.33
17		CAZJK1	9.72	2.44	5.50	2.28	74.77
		Mean	10.35	2.45	5.66	2.20	74.96
		CD@ (5%)	2.79	2.86	3.03	1.11	4.48

Conclusion

There were significant differences in the yield characters among the different flesh coloured watermelon genotypes. The data revealed that, the maximum yield per plant was observed in Sugar Baby followed by Arka Shyama and Arka Akash. Maximum fruit weight was observed in Arka Akash followed by Sugar Baby. Maximum number of fruits plant per plant recorded in GK-2, followed by Sugar Baby and Arka Shyama.

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