Quantifying Yield Attributes of Spring-Grown Sweet Corn Cultivars (Bicolor, White, and Yellow) in the Southeastern United States: Part I

Manisha Kumari[1] and Theodore McAvoy[1]

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Abstract. **A 2-year field evaluation of bicolor, white, and yellow sweet corn (*Zea mays* var. *saccharata*) cultivars was conducted in the southeastern United States during Spring 2022 and Spring 2024. This research aimed to evaluate the yield performance of commercial supersweet corn cultivars across three kernel color market segments. The experiment was conducted at the Hort Hill Research Farm on the University of Georgia Tifton campus using 10 bicolor, five white, and five yellow cultivars. Among bicolor cultivars, significant differences were observed for all measured traits. 'Obsession' (484 boxes per acre), 'Seminole Sweet' (454 boxes per acre), 'Redemption' (397 boxes per acre), and 'BSS1075' (393 boxes per acre) produced the highest marketable yields. Furthermore, 'Obsession', 'Seminole Sweet', and 'BSS1075' have ear characteristics that are well-suited for shipper sweetcorn production (overall length <11.1 inches, ear length >7 inches, ear width <2.2 inches, shank length <4 inches, and blank tip <0.5 inches). However, because of its excessive ear size, 'Redemption' may be better suited for the fresh local market segment or fall production, or it may benefit from increased planting density to lower ear size. The highest percentage of marketable ears was achieved with 'BSS8021' (94.1%), 'Redemption' (93.9%), and 'Obsession' (87.5%), indicating a lower incidence of unmarketable ears. In the white sweet corn group, no statistically significant differences were detected among cultivars for any of the measured ear traits or yield parameters. In contrast, yellow cultivars differed significantly in total length, ear width, and shank length. 'GSS1170' outperformed all other yellow cultivars for ear width and lower unmarketable ears, while 'SC1336', 'Astronaut', and 'Passion' recorded significantly higher numbers of unmarketable ears. Total ear counts also differed among yellow cultivars, with 'SC1336' (17.9 ears/plot) and 'Passion' (17.8 ears/plot) producing the highest number of ears, while 'GSS1170' had significantly fewer (12.5 ears/plot). Based on these findings, 'Obsession', 'Seminole Sweet', and 'BSS1075' are recommended bicolor cultivars for the shipper market because of high yield and favorable ear traits. 'BSS8021' and 'Redemption' had the highest percentage of marketable ears and higher yield stability for stress-prone conditions. Among yellow cultivars, GSS1170 showed good ear morphology and fewer unmarketable ears, but it had extralarge ears and longer shanks. Therefore, 'Redemption' and 'GSS1170', with their larger ear size, may be better suited for fall or local markets. Conversely, because the white sweet corn cultivars did not differ significantly in any measured yield or ear size parameter, specific cultivar recommendations should be based on ear quality for spring production in the southeastern United States.**

Sweet corn (*Zea mays* var. *saccharata*) consumed in the immature milk stage (Lertrat and Pulam 2007) is the most popular vegetable and a symbol of summer in the United States (Tracy 2000). Fresh sweet corn in the southeastern United States is primarily grown for the wholesale shipping market, where it is harvested, cooled, and distributed to retailers, supermarkets, and restaurants (Agricultural Marketing Resource Center 2022; McAvoy and Coolong 2023). In 2022, Georgia ranked second in the United States for fresh-market sweet corn acreage, with 23,454 acres harvested (US Department of Agriculture, National Agricultural Statistics Service 2022). In 2023, sweet corn contributed $175 million to Georgia's vegetable market, accounting for 13% of the total value, and ranked third among the top vegetables in the state (University of Georgia, Center for Agribusiness and Economic Development 2025). The bulk of the commercial shipper sweet corn is produced in the southwestern area of the state, with Decatur, Mitchell, and Colquitt counties accounting for more than 80% of the state's production.

Sweet corn cultivars are categorized by kernel color into yellow, white, and bicolor types, with the dominance of yellow over white producing bicolor kernels through cross-pollination (Brandenberger et al. 2006). Georgia's main spring sweet corn harvest begins in June and aims to finish before July 4, when market demand peaks. In terms of acreage distribution, bicolor cultivars dominate production with approximately 70%, followed by 25% yellow and 5% white (McAvoy and Coolong 2023). The state gains a competitive edge after Florida exits the market (approximately Memorial Day), but later summer production becomes challenging because of high temperatures and frequent rainfall. Georgia has two growing seasons, fall and spring. Compared with fall, spring season typically results in higher yields, larger ears, and less disease. Manipulating plant populations and selecting proper cultivars are the most common tools to optimize yields and desired ear size. To be considered US Fancy Grade (US Department of Agriculture, Agricultural Marketing Service 1992), ear length should be greater than 6 inches and only allow a blank tip less than one-quarter of the ear length. However, the industry standard for fresh market shipper corn (shipped in boxes) is stricter than the US Department Agriculture standard and desires ear length between 7 to 8 inches, ear width between 1.8 to 2 inches, shank length less than 3 inches, and blank tip less than 1 inch to fit 48 ears in the standard size box (McAvoy and Coolong 2023).

Sweet corn is classified based on sugar-related gene mutations: *su1* and *su2* in normal sugary sweet corn, *sh* genes (*sh1*, *sh2*, *sh4*) in supersweet corn, and a double recessive *su1se* mutation in sugary enhancer corn, affecting sugar and starch composition at the milking stage (Chen et al. 2022). Supersweet (*sh2*) corn is the type of corn grown for the fresh market shipper segment, and it is characterized by an extended shelf life and longer harvest period compared with those of other corn cultivars because the sugar converts to starch very slowly (Tracy 1996). All types of sweet corn are used in processing and fresh local sweet corn production.

Sweet corn production in the southeastern United States is influenced by climatic variability, including excessive

rainfall, temperature fluctuations, and intermittent drought, which can affect yield and quality (Greaves 1996; Konrad and Fuhrmann 2013). As a warm-season crop, sweet corn is sensitive to cold stress, with optimal growth occurring between 70 and 81 °F and yield reductions reported under suboptimal conditions below 68 °F (Haldimann 2002; Jenkins 1941; Mao et al. 2017; Shaw 1983, 1988). Precipitation timing also plays a key role in productivity (Sharratt et al. 2001). Selecting high-performing cultivars that are well-adapted to regional environmental conditions is essential for maintaining consistent yield and quality. Agronomic traits such as ear length, shank length, ear diameter, and tip fill strongly influence marketability and profitability (Paranhos et al. 2023a).

Because of the need for high-yielding, disease-resistant supersweet (sh2) sweet corn cultivars suited to the shipper market in the southeastern United States, region-specific cultivar evaluations are essential to guide grower recommendations. This study aimed to conduct a comparative evaluation of bicolor, white, and yellow spring sweet corn cultivars in the southeastern United States during the spring. This research assessed yield parameters, including various ear characteristics and marketability, to identify bicolor, white, and yellow supersweet corn cultivars that exhibit superior marketable yield performance for the fresh shipper market.

Materials and methods

Site description

Experimental site. Field experiments were conducted at the Hort Hill University of Georgia Tifton campus (lat. 31.4868407°N, long. 83.5226439°W) during Spring 2022 and Spring 2024.

Soil. The soil at Tifton, GA, USA, is classified as Tifton series (fine-loamy, kaolinitic, thermic Plinthic Kandiudults), formed in loamy marine sediments on an interfluve. It is very deep, well-drained, and highly acidic, with slopes ranging from 0% to 8% (US Department of Agriculture, Natural Resources Conservation Service 2017).

Weather data. Cumulative growing degree days and weekly rainfall during the growing seasons of Spring 2022 and Spring 2024 were recorded at the Coastal Plain Experimental Station, which is part of the University of Georgia Weather Network in Tifton, GA, USA. Growing degree days were calculated using the following formula:

$$\text{Growing degree days} = \frac{\text{Maximum Temperature} + \text{Minimum Temperature}}{2} - \text{Base Temperature}$$

This was calculated using a base temperature of 50 °F (Cross and Zuber 1972; McMaster and Wilhelm 1997), with cumulative values compared across both seasons (Fig. 1A and 1B).

Experimental design and crop management. This study was conducted using a randomized complete block design with four replications. Each plot in the experiment consisted of a single row measuring 15 ft in length with 3-ft row spacing. A plant-to-plant spacing of 6 inches (0.5 ft) was maintained within each row, resulting in 30 plants per plot. Based on the plot dimensions and row spacing, the plant population density was approximately 29,040 plants per acre. A total of 200 lb of nitrogen (N) per acre was applied to ensure adequate nutrient availability throughout the season [University of Georgia Cooperative Extension (date unknown)]. This included a preplant application of 1000 lb per acre of 5–10–15 ($N–P_2O_5–K_2O$) fertilizer supplying approximately 50 lb N per acre and two side-dress applications at 3 and 6 weeks after planting of 220 lb per acre of 34–0–0 fertilizer, with each supplying 74.8 lb N per acre for a total of 150 lb N per acre from side-dressing. Weed management consisted of a pre-emergent application of Atrazine and Dual II Magnum, followed by postemergent treatment with Atrazine and Prowl. Pest management included Coragen insecticide and Quadris fungicide for insect and disease suppression. Overhead irrigation (0.5 acre-inch per irrigation) was applied three times per week, as needed, to maintain optimal soil moisture and support uniform plant growth throughout the trial.

Experimental material

The experimental trials for this study involved three distinct categories of sweet corn: bicolor, white, and yellow. The bicolor sweet corn category included 10 cultivars: BSS1075, BSS8021, American Dream, Courage, Grizzly, Obsession, Redemption, Salute, Seminole Sweet, and Superb. The white sweet corn category included five cultivars: 378A, XTH3674, Endurance, Glacial, and Platinum. Similarly, the yellow sweet corn category featured five cultivars: GSS1170, SC1336, Astronaut, Passion, and Seminole Gold. Obsession (bicolor), Glacial (white), and Passion (yellow) were included as market standard check cultivars for their respective categories. Table 1 provides a comprehensive overview of these cultivars, including their breeding origin and disease resistance. All seeds were sourced from Seedway, LLC (Hall, NY, USA).

Harvest

A single harvest was conducted for each corn cultivar at the optimum maturity stage, as determined by silk color, kernel development, and the presence of milky sap upon kernel puncture. The harvest corresponded to 65 to 73 d after planting for all cultivars. From each plot, a 10-ft section from the center of the row was harvested to evaluate yield and marketability. Additionally, five ears were measured per plot to assess ear characteristics, including length, width, blank tip, and shank length.

Statistical analysis

Data were analyzed using JMP Pro version 18 (JMP Statistical Discovery LLC, Cary, NC, USA). Statistical analyses were conducted independently for each color category, with the bicolor, white, and yellow datasets evaluated separately. For all measured traits, a linear mixed model was applied with variety treated as a fixed effect and replication included as a random effect. An analysis of variance was conducted to assess the main effect of cultivar on each measured parameter. Data from both years were pooled to provide an overall assessment of cultivar performance. Mean separation was performed using

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[1]Department of Horticulture, University of Georgia, Tifton, GA 31793, USA

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M.K. is the corresponding author. E-mail: manisha.kumari@uga.edu.

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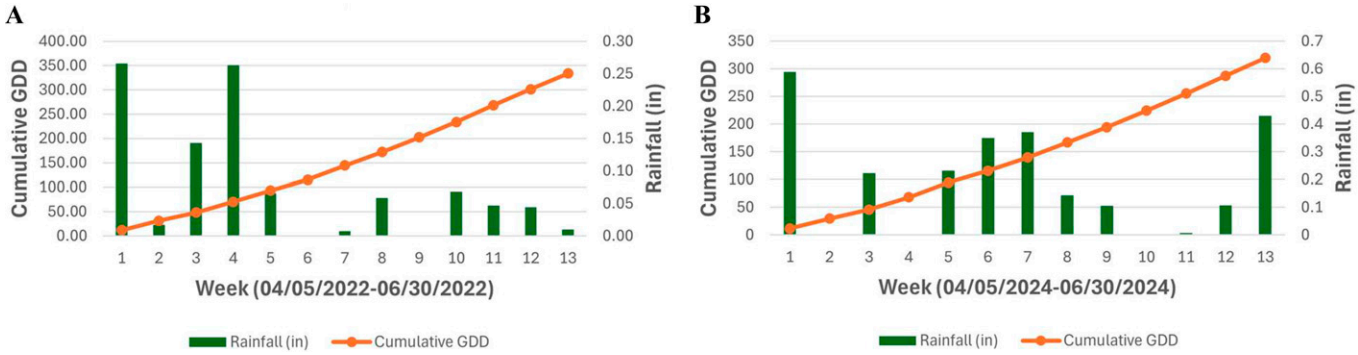

Fig. 1. Weekly cumulative growing degree days (GDD) and rainfall (inches) during the sweet corn growing seasons in (A) Spring 2022 and (B) Spring 2024. These weather data have been obtained from the Coastal Plain Experimental Station, University of Georgia Weather Network, Tifton, GA, USA.

Fisher's least significant difference test ($P < 0.05$). A similar approach focusing on main effects across multiple site-years was used by Wright-Smith et al. 2024.

Results

Bicolor

Ear characteristics. Among all the bicolor cultivars, Redemption had the highest values for total length (12.2 inches), ear length (7.9 inches), ear width (2.4 inches), shank length (4.4 inches), and no blank tip (0.0 inches). 'Salute' showed similarly high values for total length (11.8 inches), ear length (7.7 inches), ear width (2.3 inches), and shank length (4.1 inches), although it had a significantly higher blank tip (0.4 inches). Conversely, 'American Dream' exhibited the shortest total length (9.3 inches) and ear length (6.5 inches), while 'Grizzly' recorded the narrowest ear width (2.0 inches) and shortest shank length (2.7 inches). The blank tip measurement ranged significantly across cultivars, with Grizzly having the highest value (0.7 inches) and Redemption and Seminole Sweet recording the lowest values (0.0 inches and 0.1 inches, respectively). The remaining cultivars showed intermediate values across all measured parameters (Table 2).

Table 1. Brief profiles of sweet corn cultivars, seed sources, and disease resistance in sweet corn cultivar trials conducted at Tifton, GA, USA, during Spring 2022 and 2024.

Cultivars	Sources	Disease resistance[i]
Bicolor		
BSS1075	Syngenta[ii]	HR: Ps (Rp1-i); IR: Et, Bm
BSS8021	Syngenta	R: Et; Ps (Rp1-i)
American Dream	IFSI[iii]	MR: NCLB
Courage	IFSI	R: Ps (RpG); MDM
Grizzly	Crookham[iv]	—
Obsession	Seminis[v]	HR: Ps (Rp1D); IR: Et, Pst
Redemption	IFSI	MR: NCLB; R: Ps (RpG)
Salute	IFSI	MR: NCLB; R: Ps (RpGDj)
Seminole Sweet	IFSI	MR: NCLB; R: Ps (RpG)
Superb	IFSI	MR: NCLB; R: Ps (RpG)
White		
378A	IFSI	MR: NCLB
XTH3674	IFSI	MR: NCLB
Endurance	IFSI	MR: NCLB; R: Ps (RpG); MDM
Glacial	Syngenta	IR: Et; Bm
Platinum	IFSI	MR: NCLB; R: Ps (RpGDj)
Yellow		
GSS1170	Syngenta	HR: Et; Ps (Rp1-i)
SC1336	Seminis	HR: Ps (RpG)
Astronaut	Crookham	IR: Ps; NCLB; SLB
Passion	Seminis	HR: Ps (Rp1D; IR: Et; Pst)
Seminole Gold	IFSI	MR: NCLB

[i] Disease resistance: Bm = southern corn leaf blight (*Bipolaris maydis*); Et = northern leaf blight (*Exserohilum turcicum*); HR = high resistance; IR = intermediate resistance; MR = moderate resistance; R = resistance; MDM = maize dwarf mosaic; NCLB = northern corn leaf blight (*Exserohilum turcicum*); Ps = common rust (*Puccinia sorghi*); Pst = Stewart's wilt (*Pantoea stewartii*); SLB = southern corn leaf blight (*Cochliobolus heterostrophus*).
[ii] Syngenta Seeds, Downers Grove, IL, USA.
[iii] IFSI: Illinois Foundation Seeds, Inc., Tolono, IL, USA.
[iv] Crookham Company Headquarters, Caldwell, ID, USA.
[v] Seminis, Inc., St. Louis, MO, USA.

Marketability and 48-ear boxes per acre. Significant differences were observed among bicolor sweet corn cultivars for all measured parameters related to marketability and yield (Table 3). 'Obsession' and 'Seminole Sweet' demonstrated superior performance, with the highest number of marketable ears per plot (16 and 15 ears per plot, respectively) and the greatest yield in terms of 48-ear boxes per acre (484 and 454 boxes per acre, respectively). The percentage of marketable ears varied significantly among the cultivars, with BSS8021 exhibiting the highest percentage (94.1%) and American Dream exhibiting the lowest (65.4%). 'Superb' (5.8 ears per plot), 'American Dream' (5.4 ears per plot), and 'Courage' (4.9 ears per plot) recorded the highest numbers of unmarketable ears per plot, while 'BSS8021' (0.9 ears per plot) and 'Redemption' (1.1 ears per plot) had the lowest. Lower-performing cultivars included Grizzly, which recorded the fewest marketable ears per plot (8.5 ears per plot), the lowest 48-ear boxes per acre (257.0), and a relatively low total ear count (12.8 ears per plot).

Table 2. Ear characteristics of different bicolor sweet corn cultivar trials at Tifton, GA, USA, during Spring 2022 and 2024.

Cultivars	Total length[i] (inches)	Ear length[ii] (inches)	Ear width[iii] (inches)	Shank length[iv] (inches)	Blank tip[iv] (inches)
BSS1075	10.7abc[vi]	7.1 d[v]	2.2 abc	3.6 abc	0.5 ab
BSS8021	11.1 abc	7.3 cd	2.1 bc	3.8 a	0.2 bc
American Dream	9.3 c	6.5 e	2.1 bc	2.8 bc	0.4 ab
Courage	11.5 ab	7.5 bc	2.2 abc	4.0 a	0.4 ab
Grizzly	9.8 bc	7.1 d	2.0 c	2.7 c	0.7 a
Obsession	11.2 ab	7.5 bc	2.1 bc	3.7 ab	0.2 bc
Redemption	12.2 a	7.9 a	2.4 a	4.4 a	0.0 c
Salute	11.8 a	7.7 ab	2.3 ab	4.1 a	0.4 ab
Seminole Sweet	11.0 abc	7.1 d	2.1 bc	3.9 a	0.1 c
Superb	10.9 abc	7.3 cd	2.3 ab	3.6 abc	0.7 a
P value[vii]	0.0003	<0.0001	0.0249	0.0258	0.0015

[i] Total length: ear length + shank length.
[ii] Ear length: length of the ear in inches.
[iii] Ear width: width of the ear in inches.
[iv] Shank length: length of the shank in inches.
[v] Blank tip: missing kernels at the tip of the cob.
[vi] Means followed by the same letter are not significantly different based on Fisher's protected least significant difference test at 95%.
[vii] *P* value: In Fisher's least significant difference (LSD) test, $P \leq 0.05$ indicates statistical significance.

White

Ear characteristics. No statistically significant differences were observed among the white sweet corn cultivars for any of the measured ear traits, including total ear length, ear length, ear width, shank length, or blank tip length (Table 4).

Marketability and 48-ear boxes per acre. The statistical analysis revealed no significant differences among white sweet corn cultivars for any of the marketability or yield-related traits measured, including marketable and unmarketable ears per plot, total ears per plot, percent marketable ears, and 48-ear boxes per acre (Table 5).

Yellow

Ear characteristics. Significant differences were observed among yellow sweet corn cultivars for total length, ear width, and shank length, while the ear length and the blank tip did not show statistically significant differences (Table 6). Among the five cultivars, GSS1170 demonstrated the longest total length (12.0 inches), widest ear width (2.3 inches), and longest shank (4.6 inches). 'Seminole Gold' followed with a total length of 11.2 inches, ear width of 2.2 inches, and moderate shank length of 3.9 inches. SC1336 had a total ear length of 10.8 inches, which was statistically comparable to the top cultivars, but it exhibited narrower ears (2.1 inches) and a shorter shank (3.6 inches). 'Astronaut' and 'Passion' had similar total lengths (10.7 inches), ear widths (2.1 inches), and shank lengths ranging from 3.1 to 3.6 inches. All cultivars had similar ear lengths (7.1–7.5 inches) and blank tip values (0.2–0.4 inches), with no statistically significant differences observed for these traits.

Marketability and 48-ear boxes per acre. No statistically significant differences were observed among the yellow sweet corn cultivars for the number of marketable ears per plot, percentage of marketable ears, or 48-ear boxes per acre (Table 7). However,

Table 3. Marketability and 48-ear boxes per acre of different bicolor sweet corn cultivar trials at Tifton, GA, USA, during Spring 2022 and 2024.

Cultivars	Marketable ear[i] (no. per plot)	Unmarketable ear[ii] (no. per plot)	Total ear[iii] (no. per plot)	Percent marketable ear[iv] (%)	48-Ear boxes per acre[v]
BSS1075	13.0 abc[vi]	3.8 abc	16.8 abc	78.9 cdef	393.0 abc
BSS8021	11.5 bcd	0.9 d	12.4 d	94.1 a	348.0 bcd
American Dream	10.0 bcd	5.4 a	15.4 bcd	65.4 g	303.0 bcd
Courage	9.8 cd	4.9 a	14.6 cd	67.0 fg	295.0 cd
Grizzly	8.5 d	4.3 ab	12.8 d	69.9 defg	257.0 d
Obsession	16.0 a	2.6 bcd	18.6 ab	87.5 abc	484.0 a
Redemption	13.1 ab	1.1 d	14.3 cd	93.9 ab	397.0 ab
Salute	10.9 bcd	2.1 cd	13.0 d	81.4 bcd	329.0 bcd
Seminole Sweet	15.0 a	3.8 abc	18.8 a	80.7 cde	454.0 a
Superb	11.6 bcd	5.8 a	17.4 abc	68.8 efg	352.0 bcd
P value[vii]	0.0018	0.0002	0.0011	0.0001	0.0018

[i] Marketable ear: ears with good characteristics (minimum length, good tip fill, and free from damage).
[ii] Unmarketable ear: ears with split kernel or symptoms of smut or husk fire.
[iii] Total ear: marketable + unmarketable ears.
[iv] Percentage marketable ear: marketable ear/total ear*100.
[v] 48-Ear boxes per acre: containers holding 48 ears of sweet corn per acre.
[vi] Means followed by the same letter are not significantly different based on Fisher's protected least significant difference (LSD) test at 95%.
[vii] *P* value: according to Fisher's LSD test, $P \leq 0.05$ indicates statistical significance.

Table 4. Ear characteristics of different white sweet corn cultivar trials at Tifton, GA, USA, during Spring 2022 and 2024.

Cultivars	Total length[i]	Ear length[ii] (inches)	Ear width[iii] (inches)	Shank length[iv] (inches)	Blank tip[iv] (inches)
378A	10.7 a	7.5 a[v]	2.2 a	3.2 a	0.7 a
XTH3674	10.3 a	7.1 a	2.1 a	3.3 a	0.6 a
Endurance	10.9 a	7.5 a	2.2 a	3.4 a	0.7 a
Glacial	10.2 a	7.4 a	2.2 a	2.8 a	0.2 a
Platinum	11.0 a	7.6 a	2.0 a	3.4 a	0.7 a
P value[vi]	0.3477	0.1627	0.0687	0.2496	0.5078

[i] Ear length: length of the ear in inches.
[ii] Ear width: width of the ear in inches.
[iii] Shank length: length of shank in inches.
[iv] Blank tip: missing kernels at the tip of the cob.
[v] Means followed by the same letter are not significantly different based on Fisher's protected least significant difference (LSD) test at 95%.
[vi] *P* value: according to Fisher's LSD test, $P \leq 0.05$ indicates statistical significance.

the number of unmarketable ears per plot varied significantly across cultivars. 'Astronaut' (7.5 ears per plot), 'Passion' (6.5 ears per plot), and 'SC1336' (5.9 ears per plot) recorded the highest numbers of unmarketable ears, while 'GSS1170' had the fewest (1.3 ears per plot). 'Seminole Gold' showed a moderate number of unmarketable ears (5.2 ears per plot).

Total ear counts also showed significant variation among cultivars. 'SC1336' (17.9 ears per plot) and 'Passion' (17.8 ears per plot) had the highest total ear counts, whereas 'GSS1170' had the lowest (12.5 ears per plot). 'Astronaut' (15.2 ears per plot) and 'Seminole Gold' (15.3 ears per plot) exhibited intermediate total ear counts.

Discussion

This study highlights the yield performance and marketability of bicolor, white, and yellow sweet corn cultivars under conditions in the southeastern United States. Commercial shipper sweet corn quality is primarily determined by standardized traits such as ear length, diameter, tip fill, and shank length, which influence how well ears fit into standard 48-ear box configurations. Retailers prefer the 11 × 11 box, which is best suited for ears measuring 1.80 to 1.85 inches in diameter, up to 8 inches in length, and with a shank length of approximately 3 inches for optimal fit (McAvoy and Coolong 2023). While US Fancy grade standards require ears longer than 6 inches with a blank tip less than 25% of the ear length (US Department of Agriculture, Agricultural Marketing Service 1992), industry buyers often impose stricter thresholds, typically allowing less than 1 inch of blank tip and a shank less than 2.5 inches (McAvoy and Coolong 2023). Ears failing to meet these specifications are less marketable, especially in competitive spring markets.

All bicolor cultivars in this study exceeded these benchmarks for ear length and blank tip, displaying ear lengths greater than 6 inches and acceptable blank tips. White and yellow cultivars also met US Fancy standards, although no significant differences were observed among them for these traits. These results align with prior findings that yellow cultivars often exhibit ear lengths above the threshold without major variability (Paranhos et al. 2023a). Among bicolor cultivars, Obsession used as the standard check had the highest marketable yield and favorable ear traits, including total ear length, ear length, ear width, short shank length, and a minimal blank tip, aligning well with shipper market standards. 'Seminole Sweet' statistically matched 'Obsession' in yield and had a slightly higher total ear count, with comparable ear dimensions, supporting its suitability for shipper markets. 'BSS1075' also performed competitively, with a yield of 393 boxes/acre and ear traits within acceptable shipping specifications. 'Redemption' had the longest ear length, widest ear width, and no blank tip, with a high percent marketable ear rate and good yield per acre. However, its oversized ears and longer shank limit its packability in standard shipping boxes, making it better suited for local or fall markets. 'BSS8021' also demonstrated high percentages of marketable ears, indicating superior quality and stress tolerance. In contrast, 'American Dream', 'Courage', and 'Grizzly' produced lower marketable yields and higher unmarketable ear counts, often because of poor tip fill or disease issues, and performed significantly below the check cultivar Obsession.

The white sweet corn cultivar Glacial, used as the standard check, performed similarly to all other tested white cultivars, with no statistically significant differences detected for yield, marketability, or ear characteristics. All cultivars met commercial standards for total ear

Table 5. Marketability and 48-ear boxes per acre of different white sweet corn cultivar trials at Tifton, GA, USA, during Spring 2022 and 2024.

Cultivars	Marketable ear[i] (no. per plot)	Unmarketable ear[ii] (no. per plot)	Total ear[iii] (no. per plot)	Percent marketable ear[iv] (%)	48-Ear boxes per acre[v]
378A	9.1 a[vi]	4.6 a	13.8 a	68.5 a	276.0 a
XTH3674	11.4 a	5.0 a	16.4 a	72.0 a	344.0 a
Endurance	9.3 a	5.5 a	14.8 a	65.4 a	280.0 a
Glacial	9.3 a	2.3 a	11.5 a	84.3 a	280.0 a
Platinum	10.4 a	4.1 a	14.5 a	72.1 a	314.0 a
P value[vii]	0.5943	0.3557	0.0705	0.3203	0.5943

[i] Marketable ear: ears with good characteristics (minimum length, good tip fill, and free from damage).
[ii] Unmarketable ear: ears having split kernel or symptoms of smut or husk fire.
[iii] Total ear: marketable + unmarketable ears.
[iv] Percentage marketable ear: marketable ear/total ear*100.
[v] 48-Ear boxes per acre: containers holding 48 ears of sweet corn per acre.
[vi] Means followed by the same letter are not significantly different based on Fisher's protected least significant difference (LSD) test at 95%.
[vii] *P* value: according to Fisher's LSD test, $P \leq 0.05$ signifies statistical significance.

Table 6. Ear characteristics of different yellow sweet corn cultivar trials at Tifton, GA, USA, during Spring 2022 and 2024.

Cultivars	Total length[i] (inches)	Ear length[ii] (inches)	Ear width[iii] (inches)	Shank length[iv] (inches)	Blank tip[iv] (inches)
GSS1170	12.0 a[v]	7.4 a	2.3 a	4.6 a	0.2 a
SC1336	10.8 ab	7.2 a	2.1 b	3.6 b	0.4 a
Astronaut	10.7 b	7.1 a	2.1 b	3.6 b	0.4 a
Passion	10.7 b	7.5 a	2.1 b	3.1 b	0.4 a
Seminole Gold	11.2 ab	7.4 a	2.2 b	3.9 ab	0.2 a
P value[vi]	0.0299	0.614	0.0190	0.0226	0.2275

[i] Ear length: length of the ear in inches.
[ii] Ear width: width of the ear in inches.
[iii] Shank length: length of the shank in inches.
[iv] Blank tip: missing kernels at the tip of the cob.
[v] Means followed by the same letter are not significantly different based on Fisher's protected least significant difference (LSD) test at 95%.
[vi] *P* value: according to Fisher's LSD test, $P \leq 0.05$ signifies statistical significance.

length, indicating suitability for fresh market production in the southeastern United States.

The yellow sweet corn cultivar Passion, used as the standard check, demonstrated favorable ear length, shorter shank length, and high total ear count, aligning with commercial standards. However, it also had a relatively high number of unmarketable ears, which reduced its overall marketability. Although cultivar GSS1170 produced fewer total ears than the check, it exhibited excellent ear morphology, with wider ears, minimal blank tip, and the lowest number of unmarketable ears among all tested cultivars. Although its longer ears and extended shank may reduce compatibility with standard shipper box dimensions, these traits make it well-suited for local or premium fresh markets, where larger ear size is preferred. 'SC1336' and 'Astronaut' recorded high total ear counts, but they also had significantly more unmarketable ears because of quality defects, such as higher rates of split kernels, smut, or husk fire symptoms. Similar to the findings of sweet corn, studies of other vegetable crops, such as bell pepper and watermelon, reported yield losses attributed to increased unmarketable produce, often because of poor fruit quality or disease-related defects (Kumari et al. 2024, 2025). 'Seminole Gold' showed moderate performance across traits, but it did not offer a clear improvement over the check. While no yellow cultivar consistently outperformed Passion across all key metrics, GSS1170 is recommended for local market production because of its superior ear quality and lower cull rate.

Environmental conditions during spring production in the southeastern United States tend to favor higher sweet corn yields and improved ear quality because of cooler early-season temperatures that prolong vegetative growth and enhance biomass accumulation. As reported by Paranhos et al. 2023b, this extended growing period supports better ear development, leading to greater ear length, diameter, and overall marketability. The study further confirmed that yield performance in spring is positively correlated with ear traits, particularly ear length and width, rather than kernel counts. Therefore, spring cultivar selection should prioritize cultivars with superior ear morphology and resilience to fluctuating moisture and temperature conditions to optimize market-grade quality and yield. Weather conditions during the growing seasons of Spring 2022 and Spring 2024 were typical of the southeastern United States and showed similar thermal accumulation. Cumulative growing degree days reached 333.6 in 2022 and 319.5 in 2024 (Fig. 1A and 1B), with both years displaying consistent weekly growing degree days increases that reflect parallel crop development trends (Hatfield and Prueger 2015; McMaster and Wilhelm 1997; Shaw 1988). Rainfall patterns differed slightly: 2024 received a higher total (2.65 inches) compared with 2022 (1.00 inches), although rainfall in 2024 was concentrated in fewer and more intense events. In contrast, 2022 experienced more frequent but lighter rainfall. Despite these variations, both seasons provided adequate moisture during key stages such as silking and pollination, supporting favorable crop development.

The highest yields observed in this study were 484 and 454 boxes per acre for 'Obsession' and 'Seminole Sweet', respectively; both were statistically similar and closely approached the reported average of more than 500 boxes per acre for spring-grown sweet corn in Georgia (McAvoy and Coolong 2023). These cultivars not

Table 7. Marketability and 48-ear boxes per acre of different yellow sweet corn cultivar trials at Tifton, GA, USA, during Spring 2022 and Spring 2024.

Cultivars	Marketable ear[i] (no. per plot)	Unmarketable ear[ii] (no. per plot)	Total ear[iii] (no. per plot)	Percentage marketable[iv] (%)	48-Ear boxes per acre[v]
GSS1170	11.3 a[vi]	1.3 b	12.5 b	90.3 a	340.3 a
SC1336	12.0 a	5.9 a	17.9 a	69.0 a	363.0 a
Astronaut	7.7 a	7.5 a	15.2 ab	51.5 a	232.5 a
Passion	11.3 a	6.5 a	17.8 a	67.5 a	340.3 a
Seminole Gold	10.3 a	5.2 ab	15.3 ab	69.0 a	313.1 a
P value[vii]	0.3069	0.0423	0.0190	0.063	0.3069

[i] Marketable ear: ears with good characteristics (minimum length, good tip fill, and free from damage).
[ii] Unmarketable ear: ears having split kernel or symptoms of smut or husk fire.
[iii] Total ear: marketable + unmarketable ears.
[iv] Percentage marketable ear: marketable ear/total ear*100.
[v] 48-Ear boxes per acre: containers holding 48 ears of sweet corn per acre.
[vi] Means followed by the same letter are not significantly different based on Fisher's protected least significant difference (LSD) test at 95%.
[vii] *P* value: according to Fisher's LSD test, $P \leq 0.05$ signifies statistical significance.

only achieved strong yields but also met commercial quality standards, supporting their recommendation for shipper market production. 'Redemption' followed with 397 boxes/acre, slightly below the benchmark, but demonstrated favorable ear quality and a high percentage of marketable ears. However, its extralarge ears and longer shanks make it less suitable for standard shipping configurations, indicating greater potential for local or fall markets, where larger ear size is preferred. Although previous reports identified BSS8021 as a high-yielding cultivar (Silva et al. 2020), its yield was comparatively lower in this study. However, it produced the highest percentage of marketable ears, suggesting utility in environments prone to stress. Neither white nor yellow cultivars showed significant differences in total box yield.

Conclusion

This study conducted a comprehensive evaluation of bicolor, white, and yellow sweet corn cultivars over two spring seasons in the southeastern United States, revealing significant cultivar differences in yield performance and marketability. Bicolor cultivars Obsession, Seminole Sweet, and BSS1075 were top-performing cultivars for fresh shipper production. These cultivars produced high marketable yields and exhibited desirable ear traits, including moderate ear length, narrow ear width, short shanks, and minimal blank tips, aligning with industry standards. BSS8021, although not among the highest-yielding cultivars, achieved the highest percentage of marketable ears and may be particularly suited for environments where reducing unmarketable ears is a priority. 'Redemption', while also yielding well and showing strong marketability, produced larger ears with longer shanks. In the yellow category, 'GSS1170' displayed superior ear width and lower unmarketable ear counts. Its extralarge ears and longer shank may not meet shipper standards, but it still has strong potential for local or premium fresh markets. 'Passion' and 'SC1336' performed well in terms of total ear count, ear length, and shank length, which are desirable traits for commercial markets, although they also exhibited a higher number of unmarketable ears.

In contrast, bicolor cultivars Grizzly and American Dream, along with yellow cultivar Astronaut, exhibited higher unmarketable ear counts and lower marketable yields, rendering them unsuitable for optimal production systems. White corn cultivars exhibited no statistically significant differences in any measured parameters, precluding specific cultivar recommendations. These findings underscore the importance of selecting high-performing cultivars to maximize sweet corn productivity under southeastern United States growing conditions.

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