

**POSTHARVEST QUALITY OF SWEET CORN:
Impact of Hybrid, Wrapping and Husking**

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ABSTRACT

Two super sweet corn, i.e., Challenger F₁ hybrid Sh₂ and Dynasty F₁ hybrid Sh₂ were grown at Kaha Experimental Station of Vegetable Research Department, Ministry of Agriculture during 1998 and 1999 seasons. Marketable and uniform ears of two hybrids were randomly distributed into husked and unhusked ears which were subsequently divided into wrapping with stretch film and unwrapped treatment, then stored at 0°C and 95% RH. Physical (weight loss, denting, discoloration for cut ends, and visual quality) and chemical (dry matter, total soluble solids, total sugars, sucrose, reducing sugars, and starch) characters were analyzed. Results revealed that each of the weight loss, denting, discoloration for cut ends and dry matter percent increased with prolongation of storage time. In contrast, visual quality and reducing sugars decreased with time during storage. Dynasty hybrid was higher in weight loss, discoloration for cut ends, dry matter, TSS, total sugars, sucrose and reducing sugars percent and lower starch content than Challenger. Wrapping has decreased weight loss; denting and discoloration for cut ends and maintained the visual quality of ears. It has also increased TSS and resulted in higher dry matter percent after 5 days storage followed by lower percent at the end of the storage period. In contrast, unwrapped ears gave higher percent in dry matter by the end of storage period. Although unwrapped ears showed higher percent in reducing sugars compared to wrapped ones, no significant difference between these treatment was noticed as regard total sugars, sucrose percent or starch content. While unhusked ears had higher weight loss compared to husked ones, no significant difference between husked and unhusked ears was found on denting, discoloration for cut ends, visual quality, dry matter %, TSS, total sugars, reducing sugars, sucrose or starch content. Challenger showed better storability compared to Dynasty.

INTRODUCTION

Sweet corn (*Zea mays* L.) is becoming a promising vegetable crop for export. The success its exportation its based on providing optimum postharvest treatments for maintaining its quality and, therefore, improving

its shelf life. Since sweet corn has a very high respiration rate, a low temperature (0°C) and a high humidity are essential to minimize quality losses (Ryal and Lipton, 1972).

Different film wraps affect weight loss of the cobs. Weight loss of ears without trimming is double that of ears whose shanks and flags were removed. Weight loss of the former ears is rapid and reaches 22% of its initial weight after 6 days from storage. (Showalter, 1967; Aharoni *et al.*, 1996). At harvest, trimming shanks and flag leaves from sweet corn has a high impact on kernel denting and husk appearance (XXXXXXXXXX). Super sweet corn wrapped in stretch or shrink film, such as polyethylene or polyvinyl chloride film, appear fresher, less dried and have less denting than the unwrapped corn (XXXXXXXXXX). Likewise, corn stored at 1°C is in better condition than that stored at 4 or 10°C (Showalter, 1967; Hardenburg, 1971; Risse and McDonald, 1990).

Although the total soluble solids contents of both wrapped and unwrapped corn are comparable (Deak *et al.*, 1987; Riss and McDonald, 1990), the sucrose contents for all genotypes are markedly decreased after storage at 27°C (Garwood *et al.*, 1976). The authors also reported that in spite of this decrease, sucrose content in genotype shrunken-2 (Sh₂) after 96 hours storage at 27°C is found to be as almost as high as that found in sugary genotype (Su) before storage. The high sucrose content and improved sucrose retention of the Sh₂ genotype explain the choice of this genotype as a valuable candidate for fresh market usage.

Moreover, total and reducing sugar concentrations of sweet corn are found to be severely affected by the cultivar, storage time, temperature and their interactions. Sugar concentrations are lower in corn stored at 10°C compared to that stored at 0°C (Evensen and Boyer, 1986). The noticed increase in sucrose concentrations at 0°C is attributed to a decrease in the reducing sugar concentrations (Carry *et al.*, 1982).

Furthermore sweet corn hybrids differ in their starch content. A marked decrease in the starch fraction is noticed in sucro (Sh₂) before storage and progress throughout storage implying that the increase in starch level matched the rise in storage temperatures Wann *et al.*, 1971; Garwood *et al.*, 1976; Evensen and Boyer, 1986; Olsen *et al.*, 1990).

The present study was aimed to assess the impact of the different methods used for maintaining the quality of two super sweet corn hybrids during cold storage at 0°C.

MATERIALS AND METHODS

This study was conducted at Kaha Experimental Station, Vegetables Research Department, Ministry of Agriculture. The two sweet corn hybrids F₁ Challenger (Asgrow, USA) and Dynasty (Syngenta, Holland) were grown during 1998 and 1999 seasons following standard procedures. Ears were harvested at the milky stage and kept overnight at 0°C and a relative humidity of 95%.

The marketable and uniform ears were trimmed by cutting the silk ends and all the shanks to 1 cm from the ear. The ears were then randomly distributed into husked and unhusked. The leaves were completely removed from husked ears while in the unhusked ones, the outer leaves were partially removed and more of the husks were also removed to form one window of 2.5 to 4 cm wide. Half of the each husked and unhusked ears were wrapped, using stretch film of 0.09-micron thickness. Each package (contained 2 ears on a tray) was weighed, labeled, and packed in a carton box.

Physical and Chemical Analysis: Samples were used for evaluation at 0, 5, 10, 15 and 20 days from storage at 0°C and 95% relative humidity and subsequently transferred to 10°C (simulated retail display) for 24 hours. Evaluation included the following:

Weight loss percentage was estimated according to the following equation $[(\text{Initial weight of ears} - \text{weight of ears at sampling date}) / (\text{Initial weight of ears}) \times 100]$.

Denting and discoloration of cut ends were determined by the following score system, 1: None, 2: Slight, 3: Moderate, 4: Moderately severe, 5: Severe.

Visual quality was determined according a scale of scoring system (9: Excellent, 7: Good, 6: Fair, 3: Poor and 1: Unstable) which depends on the morphological defects such as wilted husks, color change of husks and kernels, denting and presence of physiological defects.

Total soluble solids (TSS) were measured with hand refractometer.

Dry matter was estimated by weighing 100 gm of fresh kernels dried them at 70°C until a constant weight was obtained, the percentage of dry matter was then calculated.

Total sugars, reducing sugars, sucrose and starch percentage were measured calorimetrically using the Spectronic "20" with 520 m μ wavelength, calculated and recorded according to Somogyi (1952) and Nelson (1974).

Statistical Analysis: A complete randomized factorial experiment with 3 factors design and 3 replications was performed, where Challenger and Dynasty hybrids (Sh₂-type) were assigned as main factor and treatments (wrapping, unwrapping) were the second factor and the third factor was the husked and unhusked treatments. Data were analyzed for statistical significant differences using LSD test at 0.05 level, according to Snedecor and Cochran (1989).

RESULTS AND DISCUSSION

Physical Characters of Sweet Corn Ears:

Weight loss: Data showed that weight loss in ears increased with time during storage (Table 1) and that the ears of Dynasty hybrid had a higher weight loss compared to those of challenger. Data also demonstrate that the weight loss was significantly higher in unwrapped ears, irrespective to the hybrid or wrapping treatments in both seasons, compared to wrapped ones. Similar results have been reported (Showalter, 1967; Aharoni et al., 1996).

Data (Table 1) also reveal that as compared to husked ears, the unhusked had higher weight loss. The higher weight loss in unhusked ears has been attributed to the movement of water from kernels through shank to the husks after 5 and 20 days from storage (Showalter, 1967).

The interaction between hybrids and wrapping treatment in weight loss during storage was significant in one season, 1998 (Table 2). In that season, ears of Challenger had more weight loss than comparably handled ears of Dynasty, e.g. wrapped or unwrapped. Therefore, unwrapped Dynasty ears exhibited highest loss in weight while those of wrapped Challenger had the least.

Denting: Table (3) shows the impact of hybrids, wrapping and husking on denting during storage. Data indicate an increase in denting, with extending the storage time, regardless of the 3 investigated factors. These findings agree with those of Showalter (1967) and Deak et al. (1987). However, the hybrid and husking treatments had mostly no significant effect on denting while wrapping significantly reduced denting below that of the unwrapped.

Table (1): Effect of hybrids, wrapping and husking on weight loss % of sweet corn ears during storage at 0°C + 1 day at 10°C.

	1998				1999			
	Days in Storage							
	5	10	15	20	5	10	15	20
Hybrids								
Challenger	2.40	3.24	3.99	5.20	2.93	3.35	4.23	5.24
Dynasty	3.54	5.07	5.99	7.19	2.04	2.83	3.86	6.53
L.S.D. at 0.05	0.36	0.64	0.49	0.42	0.13	N.S	0.16	0.78
Wrapping								
Wrapped	0.91	1.45	1.55	1.93	0.58	0.81	1.10	1.62
Unwrapped	5.05	6.87	8.43	10.46	4.39	5.38	6.98	10.15
L.S.D. at 0.05	0.36	0.64	0.49	0.42	0.13	0.47	0.16	0.78
Husking								
Unhusked	3.17	4.42	5.22	6.42	2.71	3.16	4.09	6.33
Husked	2.78	3.89	4.77	5.98	2.26	3.02	3.99	5.44
L.S.D. at 0.05	0.36	N.S	N.S	0.42	0.13	N.S	N.S	0.78

Table (2): Effect of interaction between hybrids and wrapping on weight loss % of sweet corn ears during storage at 0°C + 1 day at 10°C.

Hybrids	Wrapping	1998				1999			
		Days in Storage							
		5	10	15	20	5	10	15	20
Challenger	Wrapped	0.69	0.9	1.05	1.47	0.73	0.91	1.21	1.72
	Unwrapped	4.14	5.58	6.95	8.94	5.13	5.79	7.24	8.76
Dynasty	Wrapped	1.13	1.99	2.06	2.39	0.44	0.71	0.96	1.51
	Unwrapped	5.96	8.16	9.93	11.99	3.64	4.96	6.73	11.55
L.S.D. at 0.05 level		0.51	0.89	0.69	0.59	0.19	N.S	N.S	1.11

Table (3): Effect of hybrids, wrapping and husking on denting during storage at 0°C + 1 day at 10°C.

	0	1998				1999				
		Days in Storage								
		5	10	15	20	0	5	10	15	20
Hybrids										
Challenger	1	1.21	1.63	1.49	2.33	1	1.38	1.67	2.88	2.79
Dynasty	1	1.17	1.63	1.79	2.79	1	1.25	1.58	2.04	3.04
L.S.D. at 0.05 level	N.S	N.S	N.S	N.S	0.43	N.S	N.S	N.S	N.S	N.S
Wrapping										
Wrapped	1	1.00	1.00	1.04	1.17	1	1.00	1.00	1.17	1.46
Unwrapped	1	1.37	2.25	2.54	3.96	1	1.63	2.24	2.71	4.38
L.S.D. at 0.05 level	N.S	0.27	0.27	0.45	0.43	N.S	0.29	0.34	0.45	0.47
Husking										
Unhusked	1	1.29	1.88	2.04	2.75	1	1.42	1.74	2.12	3.08
Husked	1	1.08	1.38	1.54	2.38	1	1.21	1.50	1.75	2.75
L.S.D. at 0.05 level	N.S	N.S	0.27	N.S	N.S	N.S	N.S	N.S	0.45	N.S

Denting Score (1: None, 2: Slight, 3: Moderate, 4: Moderately severe, 5: Severe).

Discoloration of Cut Ends: Our results (Table 4) also reveal that the discoloration of cut ends of the ears also increased with time during storage and was higher in unwrapped ears compared to wrapped ones in both season. These results are consistent with the known effects of modified atmosphere packaging (MAP) in reducing the activity of polyphenoloxidase enzyme (PPO), which catalyze the oxidation reactions leading to discoloration (XXXXXXXX). In contrast, husking and hybrid had no significant or consistent effect on the discoloration response (Tables 4 and 5), which suggest that the husks do not influence the PPO activity and that the two hybrids had comparable PPO activity.

Table (4): Effect of hybrids, wrapping and husking on discoloration for cut ends of sweet corn ears during storage at 0°C + 1 day at 10°C.

	1998					1999				
	Days in Storage									
	0	5	10	15	20	0	5	10	15	20
Hybrids										
Challenger	1	1.42	1.75	1.89	2.50	1	1.58	1.67	1.84	2.54
Dynasty	1	1.17	1.58	2.67	2.67	1	1.29	1.59	2.79	3.04
L.S.D. at 0.05 level	N.S	N.S	N.S	0.29	0.61	N.S	0.29	N.S	0.36	N.S
Wrapping										
Wrapped	1.00	1.00	1.00	1.21	1.42	1.00	1.00	1.04	1.38	1.58
Unwrapped	1.00	1.58	2.33	3.33	3.79	1.00	1.88	2.21	3.25	4.003
L.S.D. at 0.05 level	N.S	0.27	0.27	0.29	N.S	N.S	0.29	0.31	0.36	0.51
Husking										
Unhusked	1.00	1.29	1.54	2.21	2.71	1.00	1.46	1.67	2.34	2.92
Husked	1.00	1.29	1.79	2.33	2.50	1.00	1.42	1.59	2.29	2.67
L.S.D. at 0.05 level	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S

Discoloration for cut ends score (1: None, 2: Slight, 3: Moderate, 4: Moderately severe, 5: Severe).

Table (5): Effect of interaction between hybrids and wrapping on discoloration for cut ends during storage at 0°C + 1 day at 10°C.

Hybrids	Wrapped	1998					1999				
		Days in Storage									
		0	5	10	15	20	0	5	10	15	20
Challenger	Wrapped	1	1.00	1.00	1.00	1.42	1	1.00	1.09	1.17	1.42
	Unwrapped	1	1.83	2.50	2.75	3.67	1	2.17	2.25	2.50	3.67
Dynasty	Wrapped	1	1.00	1.00	1.42	1.42	1	1.00	1.00	1.59	1.75
	Unwrapped	1	1.33	2.17	3.92	3.92	1	1.59	2.17	4.00	4.34
L.S.D. at 0.05 level		N.S	N.S	N.S	0.41	N.S	N.S	0.41	N.S	0.50	N.S

Visual quality: Data shown in Table (6) indicated that, during storage, visual quality of ears in both hybrids was reduced with time. The ears of Dynasty hybrid had statistically significant better visual quality, only after 5 days from storage in both growing seasons, compared to those of Challenger. Otherwise, no significant differences were observed in the visual quality between the two hybrids (Table 7). On the other hand, wrapping significantly maintained the visual quality during both tested seasons (Table 6). In this regard, wrapped ears received an average rating of 8.86 (on a scale 1 to 9 with 9 = excellent) after 20 days in storage at 0°C + 1 day at 10°C in 1998 and 8.01 in 1999 compared with 2.90 and 3.35, for 1998 and 1999, respectively, for the unwrapped treatment. This is in line with the findings of Showalter, 1967; Hardenburg, 1971; Risse and McDonald, 1990. In contrast, no statistical significant differences were noticed between husked and unhusked ears in visual quality in either season. This finding coincides with those of Showalter (1967) and Deak et al. (1987).

Chemical Characters of Sweet Corn Ears:

Dry matter %: Data revealed that dry matter contents increased with time during storage (Table 8). However, since dry matter % is referenced to the fresh weight, it is undoubtedly affected by factors that affect loss in tissue moisture content.

Table (6): Effect of hybrids, wrapping and husking on visual quality of sweet corn ears during storage at 0°C + 1 day at 10°C.

	1998					1999				
	Days in Storage									
	0	5	10	15	20	0	5	10	15	20
Hybrids										
Challenger	9.00	7.8	7.50	7.13	6.27	9.00	8.26	8.00	6.48	5.43
Dynasty	9.00	8.7	7.95	7.40	5.40	9.00	8.76	8.25	7.34	4.90
L.S.D. at 0.05 level	N.S	0.47	N.S	N.S	N.S	N.S	0.47	N.S	N.S	N.S
Wrapping										
Wrapped	9.00	9.00	9.00	8.93	8.68	9.00	9.00	9.00	8.40	8.01
Unwrapped	9.00	7.43	6.50	5.63	2.90	9.00	8.02	7.25	5.40	2.35
L.S.D. at 0.05 level	N.S	0.47	0.56	0.68	0.97	N.S	0.47	0.72	0.99	0.87
Husking										
Unskused	9.00	8.20	7.95	7.51	5.68	9.00	8.51	8.18	7.33	5.43
Husked	9.00	8.30	7.50	7.10	5.90	9.00	8.51	8.08	6.48	4.93
L.S.D. at 0.05 level	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S

Visual Quality Score (9: Excellent, 7: Good, 6: Fair, 3: Poor, 1: Unstable).

Table (7): Effect of interaction between hybrids and wrapping on visual quality of sweet corn ears during storage at 0°C + 1 day at 10°C.

Hybrids	Wrapped	1998					1999				
		Days in Storage									
		0	5	10	15	20	0	5	10	15	20
Challenger	Wrapped	9.0	9.0	9.0	8.93	4.30	9.0	9.00	9.0	8.30	7.85
	Unwrapped	9.0	6.5	6.0	5.30	4.02	9.0	7.52	7.0	4.45	3.02
Dynasty	Wrapped	9.0	9.0	9.0	8.90	8.90	9.0	9.00	9.0	8.50	8.17
	Unwrapped	9.0	8.4	6.9	6.02	1.85	9.0	8.85	7.5	6.17	1.70
L.S.D. at 0.05 level		N.S	0.66	N.S	N.S	1.37	N.S	0.66	N.S	N.S	N.S

Table (8): Effect of hybrids, wrapping and husking on dry matter % of sweet corn ears during storage at 0°C + 1 day at 10°C.

	1998					1999				
	Days in Storage									
	0	5	10	15	20	0	5	10	15	20
Hybrids										
Challenger	22.23	22.47	23.63	23.75	25.40	22.10	21.89	23.64	22.34	22.93
Dynasty	22.74	22.83	24.23	25.36	29.24	22.79	23.08	23.50	24.97	29.51
L.S.D. at 0.05 level	N.S	N.S	N.S	1.09	1.59	N.S	N.S	N.S	1.13	1.06
Wrapping										
Wrapped	-	23.33	23.05	24.69	25.40	-	23.18	23.09	23.96	24.68
Unwraoed	-	21.98	24.81	24.41	27.84	-	21.79	24.08	23.36	27.77
L.S.D. at 0.05 level	-	0.95	0.83	N.S	1.59	-	1.30	1.06	N.S	1.06
Husking										
Unhusked	-	22.95	23.50	24.12	26.40	-	22.49	23.16	23.29	25.68
Husked	-	22.35	24.35	24.99	26.83	-	22.49	24.01	24.03	26.76
L.S.D. at 0.05 level	-	N.S	0.83	N.S	N.S	-	N.S	N.S	N.S	1.06

A statistically significant increase was noticed in dry matter content in the ears of Dynasty hybrid, after 15 and 20 days from storage in both seasons, compared to those of Challenger.

Data also demonstrate that, in both seasons, wrapped ears had a higher dry matter percent after 5 days followed by a lower percent up to the end of the storage period compared to unwrapped ears.

Furthermore, a statistically significant difference in dry matter percentage was only noticed between husked and unhusked ears after 10 and 20 days of storage in the first and second season, respectively.

Total soluble solids: Data indicated that ears of Dynasty hybrid had higher TSS percent compared to those of Challenger through the storage period (Table 9).

It was also noticed that wrapping tend to increase TSS compared to unwrapping treatment. A statistically significant difference was demonstrated between hybrids in both seasons. The difference between wrapping and unwrapping treatments was also found to be statistically significant after 5 and 20 days from storage in first season and after 5 and 10 days from storage in second season (Table 9). These results agree with those of Deak et al. (1987) and Riss and McDonald (1990, who suggested that the increase in TSS and dry matter percentage may be due to dehydration.

Data also revealed that husking do not affect the percent of TSS in sweet corn ears during storage.

Total sugars and sucrose: Although the total sugars and sucrose percent in ears of Dynasty hybrid were higher than those in ears of Challenger at the beginning of the storage period, thereafter with lengthening the storage period, the former ears showed lower values compared to those of Challenger (Tables 10 and 11). In contrast, total sugars and sucrose percent of Challenger ears increased during storage. These results are in agreement with those of Evensen and Boyer (1986) and Olsen et al. (1990).

Reducing sugars: Data also reveal that concentration of reducing sugars decreased with time during storage (Table 12). All over the storage period, the ears of Dynasty hybrid had a higher percent of reducing sugars compared to those of Challenger.

Table (9): Effect of hybrids, wrapping and husking on T.S.S of sweet corn ears during storage at 0°C + 1 day at 10°C.

	1998					1999				
	Days in Storage									
	0	5	10	15	20	0	5	10	15	20
Hybrids										
Challenger	11.90	11.18	10.06	11.85	11.63	12.00	9.93	11.71	10.38	10.23
Dynasty	13.20	13.08	13.13	13.50	13.30	16.33	15.10	14.83	13.73	13.15
L.S.D. at 0.05 level	0.90	0.72	1.16	0.69	0.62	1.37	0.79	0.42	0.70	0.57
Wrapping										
Wrapping	-	12.60	11.88	12.85	12.83	-	13.05	13.63	11.98	11.45
Unwrapped	-	11.65	11.73	12.50	12.10	-	11.98	12.91	12.13	11.93
L.S.D. at 0.05 level	-	0.72	N.S	N.S	0.62	-	0.79	0.42	N.S	N.S
Husking										
Unhusked	-	12.05	11.53	12.60	12.05	-	12.68	13.38	12.11	11.88
Husked	-	12.20	11.65	12.80	12.88	-	12.35	13.16	12.00	11.50
L.S.D. at 0.05 level	-	N.S	N.S	N.S	0.62	-	N.S	N.S	N.S	N.S

Table (10): Effect of hybrids, wrapping and husking on total sugars % (gm/100 gm fresh weight) of sweet corn ears during storage at 0°C + 1 day at 10°C.

	1998					1999				
	Days in Storage									
	0	5	10	15	20	0	5	10	15	20
Hybrids										
Challenger	11.49	11.4	12.14	7.47	15.28	11.19	10.36	11.09	13.50	14.52
Dynasty	16.50	12.61	11.95	9.40	7.42	16.96	11.71	11.25	8.23	8.21
L.S.D. at 0.05 level	N.S	N.S	N.S	N.S	1.49	N.S	1.34	N.S	2.55	1.39
Wrapping										
Wrapped	-	12.39	11.32	8.01	12.13	-	11.47	11.40	10.44	12.09
Unwrapped	-	11.62	12.77	8.86	10.57	-	10.59	10.94	11.32	10.64
L.S.D. at 0.05 level	-	N.S	1.09	N.S	N.S	-	N.S	N.S	N.S	1.39
Husking										
Unhusked	-	12.47	12.32	8.44	11.04	-	11.50	10.27	10.25	11.35
Husked	-	11.54	11.77	8.43	11.66	-	10.56	12.07	11.50	11.38
L.S.D. at 0.05 level	-	N.S	N.S	N.S	N.S	-	N.S	1.41	N.S	N.S

Table (11): Effect of hybrids, wrapping and husking on sucrose % (gm/100 gm fresh weight) of sweet corn ears during storage at 0°C + 1 day at 10°C.

	1998					1999				
	Days in Storage									
	0	5	10	15	20	0	5	10	15	20
Hybrids										
Challenger	10.93	11.10	11.78	6.82	15.12	10.60	10.07	10.85	13.19	14.37
Dynasty	15.9	12.28	11.72	9.10	7.06	16.49	11.39	10.70	7.69	7.82
L.S.D. at 0.05 level	0.91	N.S	N.S	N.S	1.45	0.67	1.37	N.S	2.54	1.45
Wrapping										
Wrapped	-	12.15	10.99	7.42	11.88	-	11.23	10.93	10.06	11.83
Unwrapped	-	11.24	12.52	8.49	10.30	-	10.23	10.64	10.83	10.35
L.S.D. at 0.05 level	-	N.S	1.10	N.S	N.S	-	N.S	N.S	N.S	1.45
Husking										
Unhusked	-	12.13	12.00	7.84	10.74	-	11.19	9.79	9.82	11.10
Husked	-	11.26	11.5	8.07	11.45	-	10.27	11.78	11.07	11.15
L.S.D. at 0.05 level	-	N.S	N.S	N.S	N.S	-	N.S	1.42	N.S	N.S

Table (12): Effect of hybrids, wrapping and husking on reducing sugars % (gm/100 gm fresh weight) of sweet corn ears during storage at 0°C + 1 day at 10°C.

	1998					1999				
	Days in Storage									
	0	5	10	15	20	0	5	10	15	20
Hybrids										
Challenger	0.55	0.29	0.37	0.32	0.15	0.59	0.32	0.25	0.26	0.17
Dynasty	0.60	0.34	0.24	0.30	0.36	0.47	0.30	0.30	0.52	0.42
L.S.D. at 0.05 level	N.S	N.S	0.12	N.S	0.11	0.19	N.S	N.S	0.27	0.13
Wrapping										
Wrapped	-	0.25	0.34	0.26	0.25	-	0.24	0.23	0.30	0.26
Unwrapped	-	0.38	0.27	0.36	0.27	-	0.39	0.31	0.48	0.29
L.S.D. at 0.05 level	-	0.09	N.S	0.07	N.S	-	0.08	N.S	0.48	N.S
Husking										
Unhusked	-	0.34	0.33	0.27	0.30	-	0.31	0.25	0.36	0.32
Husked	-	0.27	0.28	0.35	0.22	-	0.31	0.3	0.43	0.23
L.S.D. at 0.05 level	-	N.S	N.S	N.S	N.S	-	N.S	N.S	N.S	N.S

Although unwrapped ears had higher percent of reducing sugars than those of wrapped ones (Table 12), the concentration of these sugars in husked and unhusked ears were comparable.

Starch: Data showed that the increase in the concentration of starch in Challenger ears, which was noticed with prolongation of the storage period up to 15 days, was subsequently followed by a decrease at the end of storage period (Table 13). Ears of Challenger hybrid had a higher concentration of starch than those of Dynasty. Similar results are reported (Wann et al., 1971; Garwood et al., 1976; Evensen and Boyer, 1986; Olsen et al., 1990).

In the second season, a statistically significant increase in the concentration of starch was only noticed after 5 days from storage in wrapped ears compared to unwrapped ones (Table 13). Similarly, a statistically significant increase in the concentration of starch was only noticed after 10 and 15 days from storage in unhusked ears compared to husked ones.

Table (13): Effect of hybrids, wrapping and husking on starch % (gm/100 gm fresh weight) of sweet corn ears during storage at 0°C + 1 day at 10°C.

	1998					1999				
	Days in storage									
	0	5	10	15	20	0	5	10	15	20
Hybrids										
Challenger	10.46	10.49	12.28	12.93	10.42	10.47	11.31	11.77	13.07	7.55
Dynasty	6.80	7.45	6.88	6.90	7.26	7.70	6.67	6.99	6.95	8.48
L.S.D. at 0.05 level	2.70	1.74	1.53	1.68	1.80	1.16	1.65	1.98	1.13	N.S
Wrapping										
Wrapped	-	9.13	9.10	9.79	7.85	-	9.65	8.83	9.86	8.23
Unwrapped	-	8.81	10.36	10.04	9.80	-	8.33	9.92	10.16	7.79
L.S.D. at 0.05 level	-	N.S	N.S	N.S	1.80	-	1.65	N.S	N.S	N.S
Husking										
Unhusked	-	8.27	10.12	10.50	9.64	-	8.87	10.42	11.02	7.99
Husked	-	9.67	9.35	9.30	8.04	-	9.11	8.34	9.01	8.04
L.S.D. at 0.05 level	-	N.S	N.S	N.S	N.S	-	N.S	1.98	1.13	N.S

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الملخص العربي

جودة كيزان الذرة السكرية بعد الحصاد :
تأثير الهجن والتغليف والتقسير

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أجرى هذا البحث بمزرعة محطة بحوث البساتين بقها - محافظة القليوبية - مصر ، بزراعة اثنين من هجن الذرة السكرية (شالنجر - داينستى) خلال موسمي ١٩٩٨ ، ١٩٩٩ .

تم جمع كيزان الذرة السكرية في مرحلة الطور اللبنى وتم نقلها إلى معهد بحوث البساتين بالجيزة حيث خزنت على درجة الصفر °م ورطوبة نسبية ٩٥% وفى صباح اليوم التالي تم فرز واختيار الكيزان حسب مواصفات التصدير وتم تقسيمها إلى مجموعتين : مجموعة يتم تقشير أغلفتها تماما ومجموعة أخرى تم تهذيب أغلفتها ونزع بعض الأغلفة من جانب واحد فقط بعرض من ٣ - ٤ سم لتظهر الحبوب (إي تكوين نافذة) وتم أيضا تهذيب حوامل الكيزان الى طول ١ سم لكلا المجموعتين . ثم وضعت الكيزان سواء التي تم تقشيرها أو الغير مقشرة في أزواج بكل طبق ثم تم تغليف نصف الأطباق من كل معاملة بأسترتش فيلم .

تم ترقيم العينات ووزنها ووضعت في صناديق كرتون حيث خزنت على درجة صفر °م ورطوبة نسبية ٩٥% لمدة ٥ ، ١٠ ، ١٥ ، ٢٠ يوم وتم نقل العينات على درجة ١٠ °م لمدة يوم واحد قبل تقييم الصفات الطبيعية والكيميائية ، وتم إجراء التقييم على ثلاثة مكررات في كل تاريخ فحص وأيضا في عينة البداية .

وقد أظهرت النتائج مايلي :

١- ازداد كلاً من الفقد في الوزن والتسنين للكيزان والتغير في لون الأجزاء المقطوعة وكذلك المحتوى من السكريات والنشا بينما تناقصت قيم جودة المظهر وانخفضت النسبة المئوية للسكريات المختزلة بإطالة فترة التخزين .

٢- كانت نسبة فقد الوزن والتغير في لون الأجزاء المقطوعة والمادة الجافة والمواد الصلبة الذائبة الكلية والسكريات الكلية والمختزلة أكثر ارتفاعا في الهجين داينستى عن الهجين شالنجر بينما تميز الأخير بارتفاع محتواه من النشا .

٣- أدى التغليف بالأسترتش فيلم إلى خفض الفقد في الوزن والتسنين والتغير في لون الأجزاء المقطوعة وحافظ على جودة مظهر الكيزان كما أدى إلى زيادة المواد الصلبة الذائبة الكلية أما فيما يتعلق بمعاملة الكيزان الغير مغلفة بالأسترتش فيلم فقد سجلت أعلى نسبة مئوية للمادة الجافة وأعلى نسبة من السكريات المختزلة . لم يلاحظ وجود فرق معنوي للتغليف على النسبة المئوية لكلا من السكريات الكلية والسكروز والنشا .

٤- لم يلاحظ وجود فرق معنوي على استخدام الكيزان بأوراقها المغلفة أو بدونها على كلا من التسنين ، التغير في لون الأجزاء المقطوعة ، جودة المظهر والنسبة المئوية للمادة الجافة والسكريات الكلية والمختزلة والسكروز والنشا والمواد الصلبة الذائبة الكلية ولكن الكيزان التي خزنت بأوراقها المغلفة كان فقد الوزن فيها أعلى عن التي خزنت بدون أوراقها المغلفة .