AFTER HARVEST QUALITATIVE AND QUANTITATIVE BEHAVIOUR OF SOME SUGAR BEET VARIETIES

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ABSTRACT

The studies reported here were undertaken at Sugarcane Research Institute Faisalabad during the crop season 2006-2007. Four sugarbeet varieties namely polyrex, polyplus, SD PAK 01/06 and SD PAK 02/06 were compared for weight losses, pol and sugar recovery after harvest while storing under shade and sun conditions for a period of six storage days. Statistically significant difference was recorded in all studied parameters. The maximum pol of samples stored under shade (16.19%) and sun (16.61%) was observed in SD PAK 01/06 and same trend was found in sugar recovery. Polyplus showed minimum weight losses, 10.55% and 11.97%, in sun and shade respectively. The experiment pointed out a direct relation of increasing weight losses with the increase in pol and sugar recovery as well as variable after harvest behaviour of four sugarbeet varieties with respect to three studied parameters.

Key words: Qualitative, Quantitative, Behavior, Sugar beet.

INTRODUCTION

Sugarbeet is the second important source of white sugar in Pakistan after sugarcane. Its production and yield has decreased upto 22.81% and 30.32% as compared to the last year (Anonymous, 2006). There may be many reasons of this decrease but post harvest losses are more important faced by beet growers and millers. The sugar concentration increases for a few days after harvest in sugarbeet due to loss of moisture during storage (Chen and Chou, 1993). Sarwar *et al*. (2008) conducted post harvest studies in four sugarbeet varieties namely and Aura and observed that increase in weight losses increased pol% and sugar recovery but in variable trend. Vicent *et al.* (2000) studied deterioration of beet taproots for five days and found an increasing trend in glucose, sucrose and fructose concentration. Similarly Jaggard *et al.* (1977) reported four times increase in reducing sugars and 0.02% decrease in sugar contents per day during post harvest losses when beets were stored in clamps for eighty four day.

The sugarbeet stored in clamps increases temperature inside clamps due to respiration that accelerates sugar losses @ 0.1% in the clamp per days (Hougton and Hopkinson, 1998) while small sized beets show higher respiration losses as compare to large sized beets due to their proportionally large sized surface area (Augustinussen *et al., 1995).*

Present field study was made to assess the after harvest qualitative and quantitative behavior of some sugarbeet varieties.

MATERIALS AND METHODS

The field study was conducted during 2006-07 where four beet varieties viz; polyrex, polyplus, SD PAK 01/06 and SD PAK 02/06 were sown in the last week of November 2006 in RCB design with plot size 26.7 x 5.6m. During five months of growth period all recommended agronomic practices were practiced. The crop was harvested in the first week of May 2007 and forty-eight undamaged, unrotten, round and equal sized beet samples of each variety were obtained at harvest. These samples were divided into twelve lots of twelve bulbs each and these twelve lots were further sub divided into two sub lots storing under shade and sun covering them with 45cm thick cane bagasse cover. Each sample was initially weighed and regularly on daily basis before crushing in order to ascertain evaporation losses. Polarity was determined by the procedure and method described in laboratory manual for Queensland sugar mills (Anonymous, 1970) in order to calculate pol and sugar recovery. The statistical analysis was carried out through analysis of variance technique under RCBD (Factorial) (Steel *et al*., 1997).

RESULTS AND DISCUSSION

Percent weight losses in sugarbeet: It is an important quantitative factor for the farmers. A perusal of data given in table-1 and table-2 indicated significant differences between the four vareital means as well as significant interaction of the percent weight losses of samples stored in sun. Polyplus lost minimum weight (10.55%) stored under shade while SD Pak 01/06 lost maximum weight (12.38%). Similarly maximum weight

was lost by SD PAK 01/06 (13.75%) when beet samples were stored under sun, followed by SD PAK 02/06, polyrex and polyplus that lost 13.17%, 11.99% and 11.97% weight, respectively. SD PAK 02/06 was statistically at par with SD PAK 01/06 polyrex and polyplus. The results indicated a continuous and steady decrease in weight of samples stored under both conditions. The lower decrease in weight of samples stored under shade was due to absence of direct sun rays. Malik *et al.*, (2003) recorded higher weight losses in three sugarbeer varieties when stored under sun as compare to shade.

Pol% in sugarbeet: It is an important qualitative factor for millers. Data given in table-3 and table-4 revealed that maximum pol% (16.19%) was observed in variety SD PAK 01/06 when its samles were stored under shade. It was followed by SD PAK 02/06 (15.08%), polyrex (14.21%) and polyplus (13.85%) in descending order with respect to pol%. A similar trend was recorded in those samples stored under sun where maximum pol% (16.61%) was noticed in SD PAK 01/06 while minimum pol% (13.98%) in polyplus. SD PAK 02/06 was statistically at par with SD PAK 01/06 while polyplus was statistically at par with polyrex. These results demonstrated a direct relation between pol% increase and water loss through evaporation. This description commensurates the findings of Sarwar *et al*. (2008) who found a similar relation between weight loss and pol% increase.

Sugar recovery %: It is the second most important criteria of beet purchase for millers. The data given in table-5 and table-6 indicated almost similar trend in sugar recovery as that of pol% because it is directly related to pol%. The highest value of sugar recovery (13.69%) was recorded in SD PAK 01/06 and lowest sugar recovery (11.35%) in polyplus while SD PAK 02/06 and polyrex showed intermediate results by giving 12.58% and 11.71% sugar recovery, respectively when samples of these varieties were stored under shade. When the samples were stored under sun a trend analogous to table-5 for maximum and minimum values was noticed. The maximum sugar recovery 14.11% was recorded in SD PAK 01/06 while SD PAK 02/06, polyrex and polyplus gave 13.63%, 11.98% and 11.48% sugar recovery, respectively (table-6). These results infer that decrease in water contents, as a result of evaporation, increased sugar recovery of beet samples during six days. This description commensurates the findings of Malik *et al.*, (2003).

Conclusion: Decrease in water contents, increases pol% and sugar recovery of healthy undamaged beet samples during first week of storage.

Recommendations: SD PAK 01/06 is recommended for millers while Polyplus for farmers.

Table-1: % weight losses of samples stored in shade

Sr. #	Varieties	%wt losses during storage in shade 1-6 days						
		1	2	3	4	5	6	Average
1.	Polyrex	0	6.25	10.14	13.87	16.13	18.45	10.81b
2.	Polyplus	0	6.78	11.14	12.35	13.70	19.34	10.55b
3.	SD PAK 01/06	0	7.85	11.61	15.11	18.39	21.33	12.38a
4.	SD PAK 02/06	0	9.58	13.16	15.01	16.87	18.78	12.23a
	Average	0f	7.62e	11.51d	14.09c	16.27b	19.48a	

Table-2: - % weight losses of samples stored in sun

Sr. #	Varieties	%wt losses during storage in sun 1-6 days						
		1	2	3	4	5	6	Average
1.	Polyrex	0j	5.63i	9.32gh	14.14f	19.09cd	23.76a	11.99b
2.	Polyplus	0j	5.14i	10.78g	17.00de	18.34cde	20.58bc	11.79b
3.	SD PAK 01/06	0j	11.44g	14.19f	15.85ef	18.82cd	22.24ab	13.75a
4.	SD PAK 02/06	0j	6.72hi	9.74g	18.68cd	19.88bc	24.04a	13.17a
	Average	0f	7.23e	11.01d	16.42c	19.03b	22.66a	

Table-3: - Pol% of samples stored in shade

Sr. #	Varieties	Pol% of samples during storage in shade 1-6 days						
		1	2	3	4	5	6	Average
1.	Polyrex	11.85	12.99	13.74	14.82	15.14	16.69	14.20c
2.	Polyplus	11.61	12.70	13.35	14.45	15.25	15.76	13.85c
3.	SD PAK 01/06	13.49	14.76	15.95	16.63	17.64	18.66	16.19a
4.	SD PAK 02/06	12.79	13.34	14.72	15.52	16.33	17.60	15.08b
	Average	12.48e	13.45d	14.44c	15.36b	16.09b	17.18a	

Table-4:- Pol% of samples stored in sun

Sr. #	Varieties	Pol% of samples during storage in sun 1-6 days						
		1	2	3	4	5	6	Average
1.	Polyrex	11.97	13.76	13.86	15.20	15.67	16.40	14.48b
2.	Polyplus	11.95	12.95	13.10	14.18	15.15	16.56	13.98b
3.	SD PAK 01/06	13.24	13.33	16.28	17.02	19.62	20.20	16.61a
4.	SD PAK 02/06	13.76	14.49	15.50	16.51	17.61	18.91	16.13a
	Average	12.73d	13.63cd	14.69bc	15.73b	17.01a	18.02a	

Table-5:- Sugar recovery% of samples stored in shade

Sr. #	Varieties	Sugar recovery % of samples during storage in shade 1-6 days						
		1	2	3	4	5	6	Average
1.	Polyrex	9.35	10.49	11.24	12.32	12.64	14.19	11.70c
2.	Polyplus	9.11	10.20	10.85	11.95	12.75	13.26	11.35c
3.	SD PAK 01/06	10.99	12.26	13.45	14.13	15.14	16.16	13.69a
4.	SD PAK 02/06	10.47	10.84	12.22	13.02	13.83	15.10	12.58b
	Average	9.98d	10.95d	11.94c	12.86b	13.59b	14.68a	

Table-6:- Sugar recovery % of samples stored in sun

Sr. #	Varieties	Sugar recovery% of samples during storage in sun 1-6 days						
		1	2	3	4	5	6	Average
1.	Polyrex	9.47	11.26	11.36	12.70	13.17	13.90	11.98b
2.	Polyplus	9.45	10.45	10.60	11.68	12.65	14.06	11.48b
3.	SD PAK 01/06	10.74	10.83	13.78	14.52	17.12	17.70	14.12a
4.	SD PAK 02/06	11.26	11.99	13.00	14.01	15.11	16.41	13.63a
	Average	10.23d	11.13cd	12.19bc	13.23b	14.52a	15.52a	

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