FACTOR AFFECTING QUALITY OF SUGAR BEET AT SEMI- ARID AREAS OF ISFAHAN

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INTRODUCTION

According to the last 5 years record , the average sugar beet production in our country has not covered more than 80 % of formal capacity of the factories . Decrease in sugar beet cultivation , low yielding of cultivated farms are some reasons . More over the lower quality of produced beet specially at semi _ arid area in the recent years ,do not allow processors to recover the agreable sugar from beet , so in general more than 20 % of sugar go to Molasses .

During last 10 years most attempt has been done on technological quality which affected by S.c , k , Na , amino _ N and molasses . (Rover 1999) . climatic condition and agronomic factors such as location , nutrition , soil ph , irrigation , pests and diseases , harvesting time, storage and also delivery of beet affect the quality of sugar beet . (Huijbregts 1996 , vandergeten 1998) . Researches has been done in Italy show that quality of beet change from location to location . (vallini 1992) . Achin Rover (1999) reported that in the year which Precipitation is low and the crops suffer drought stress , impurities increase and the quality of beet decrease .Gordo and Bilbao (1999) proved that beet which suffered drought stress in south part of Spain had lower response to N fertilizers .

Researches has been done in Yugoslavia during 1981 _ 1995 show that spring rainfall affect technological quality of sugar beet . Pacuta (1998) showed that the quality of beet changes by liquid application of N fertilizer at moderate and warm climatic condition of Slovakia .

Alimoradi (1990) reported that there are negative correlation between sugar content with sodium (Na) and chloride (Cl). So the quality of sugar beet more affected by Na than another impurities .

The objective of this research is to determine factors affecting quality of sugar beet at semi _ arid areas

MATERIALS AND METHODS

Eight locations from semi _ arid and six locations from temperate areas was selected at the district of three sugar factories in central part of Iran .Selected samples of the beets brought to factories from all location every day . The brei of selected samples are freezed and transferred to " Research and Laboratory Services Center " in Isfahan . Samples are analyzed for S. c . , k , Na and amino _ N by Betalyser and Authoanalyzer equipment's .

Calculation for all parameters , their correlation and regression model has been done , and for simulation of new formula we have used S A S . Soft Ware

RESULTS

A) SEMI _ ARID AREAS:

The results of samples from semi _ arid areas at 1997-1998 are shown in table 1 , The average of Sugar content varies from 14 . 31% in Lenjan to 16 .37 % in Rouidasht . Potassium varies from 5 . 82 me q . / 100 gr. beet in Lenjan to 6 . 86 meq. / 100 gr. beet in Borkhar , Sodium varies from 3 . 54 me q. / 100 gr. beet in Borkhar to 6 . 13 meq. / 100 gr. beet in Baraan .and amino _ N Varies from 3 .09 meq. / 100 gr. beet in Lenjan to 4 . 90 me q. / 100 gr. beet in Borkhar .The average S. c , k , Na and amino _ N of 3234 samples from 1997 _ 98 are 15 . 85 %, 6 . 27 , 4 . 46 and 3 . 98 meq. / 100 gr. beet respectively .

Table 1 Average sugar content , K, Na and amino _ N in different location of Semi _ arid areas of Isfahan Province 1997 _ 98,1998-99

Areas	No,of Samples	S.C	K	Na	A-m
Borkhar	1399	16.70	6.87	3.40	4.69
Baraan	756	15.67	6.25	5.63	4.14
Ghohab	804	16.34	6.67	3.98	4.87
Rouidasht(1)	1791	17.08	6.13	4.62	4.08
Rouidasht(2)	976	15.46	6.25	4.79	3.62
Lenjan	303	14.73	6.24	5.38	3.58
Mobarake	534	14.67	6.05	4.42	3.91
Mahyar	259	15.19	6.56	4.18	4.11

B) TEMPERATE AREAS :

The results of temperate area are shown in table2 .The average of sugar content and impurities differ from semi _ arid areas . Sugar content are from 16. 92 % in Khanmirza to 19. 51% in Semirom . The average of impurities in Semirom are l ower than Khanmirza . The average of S. c, k, Na and amino _ N of 433 samples are 17.75 % 6.40 , 1.81 and 2.69 me q. / 100 gr. beet respectively . The sugar molasses produced in two factories during two years and estimating sugar molasses, calculated by reinefeld formula are shown in table 5. As we see in this table the percentage of sugar molasses by reinefeld are similar in two year in two sugar factories however in 1997 _ 98 was a little more but it was not significant . Actual produced molasses was lower

than calculated amount for both factories. Mobarake produced the lower amount (1.56 %) in 1997 _ 98 and Isfahan produced the highest amounts (2.08) in 1998 _ 99 . The differences between two sugar factories in 1997 _ 98 is 0.54 % and in 1998 _ 99 is 0.13 % . As we see there are big differences between estimated and actually sugar molasses , so according to parameter estimates , based on all data during two years (table4) it has been simulatedy new model as below :

" y = 22.85 - 0.65 (k) – 0.98 (Na) – 0.06 (a N)

all variable was significant al 1 % level and r = 0.9379

Table 2 _ Average sugar content , K, Na and amino _ N in different location of Temperate areas of Chahar _ Mahal province 1997 _ 98, 1998-99

Areas	No,of Samples	S.C	K	Na	A-m
Semirom	162	20.11	5.64	1.52	3.01
Khanmirza	191	17.39	6.85	2.75	3.88
Sefiddasht	131	18.09	6.85	1.84	3.32
Kiar	141	17.82	6.64	1.83	3.33
Lar	256	17.41	6.23	1.89	2.81
Gandoman	113	18.67	6.74	1.39	3.03

CONCLUSION

1 – Different location produced beet with different quality even in the same areas , Rouidasht produced highest sugar content at semi _ arid area for both year . The lowest sugar content is produced at Lenjan in 1997 _ 1998 and in Mahyar in 1998 _ 1999 . There are no significant between Lenjan and Mahyar for sugar content . Semirom produced the highest sugar content and Khanmirza had the lowest at temperate area for both years . These are because of climatic condition and also agronomic factors.These results prove vallini (1992 , Huijbergts (1996 , and vandergeten (1998) .

2 – Semi _ arid areas produced lower quality beet than temperate areas in all location . Sugar beet at semi _ arid areas suffer drought stress and this is the same results of Achin Rover (1999) .Potassium has no negative effect on sugar beet quality in both climates (table 5) . The average of K are about 6 Meq. / 100 gr. beet for both areas and both years. Higher demand of sugar beet to potassium , no application of this element during last 30 years are probably the main reasons .Sodium has the highest negative effect on sugar beet quality . The correlation coefficient at semi _ arid areas is much higher than temperate . Low precipitation , lack of water for irrigation do not allow sugar beet to do the photosynthesis and spend the materials .There is no negative correlation between S. c and amino _ N in this experiment (table 5).In semi _ arid areas .Drought stress and high temperature is the main reason of that

as Gordo and Bilbao suggest .There is low negative correlation between S. c and amino_ N in temperate areas . Finally , sodium is the main impurity in semi _ arid areas and supply enough water equal to evapo _ transpiration may reduce this negative effect . Reinefeld formula does not suitable for semi _ arid areas as we have in many provinces , so it is necessary to evaluate the role of each parameter and change the Co _ efficients. the new simulated formula is much more suitable of another formula specially for the samples which sugar content are between 13.5% to 17.5% . We had no pilot plant to coordinate these research in Practice . c , but because of importance of this , we hope to do that in near future .

Table 3. actual Sugar molasses and estimated sugar molasses by reinefeld formula for two sugar factory during two years .

	1997-98		1998-99	
	Actually %	reinefeld %	Actually %	reinefeld %
Isfahan	2.10	3.860	2.08	3.627
Mobarake	1.56	3.880	1.95	3.660

Table 4. Parameter estimates for simulated model, Based on all data (7309 samples).

Variable	Parameter Estimate	Standard Error	Prob>[T]
Intercept	22.845	0.105	0.0001
Potassium	-0.653	0.017	0.0001
Sodium	-0.981	0.003	0.0001
Nitrogen	-0.043	-0.012	0.0001

Table 5 . Coefficient correlation of sugar content with K, Na , amino _N in four selective location

Year	Areas	K	Na	amino - N
1997_98	Lenjan , Semi _ arid , low S. c. Rouidasht , Semi _ arid high S.C. Khanmirza , Temprate , low S. c. Semirom , Temprate , high S . c.	0.514 0.306 0.375 0.148	-0.846 -0.708 -0.402 -0.148	0.208 0.125 -0.299 -0.322

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