

Effect of Drought on the Performance of Major Fruits During-2000, in Highland Balochistan

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Abstract: In Balochistan due to no rain and snow fall which was held responsible for increasing water table, affected Karezes and Tubewells so badly that most of the orchards became dried. The water table declined up to 7 meters annually, and it was not possible for farmers to meet the situation in time. The most of the orchards were either uprooted or replaced by vegetable growing. Data revealed that the plant mortality rate due to drought was higher in S.H.Balochistan i.e., 242.38 trees as compared to the N.H.Balochistan i.e., 240.98 trees. The overall losses of the major fruits was higher in N.H.Balochistan i.e., 54.39 % as to the S.H.Balochistan which was 39.76 %. Results indicated that Karezes and springs became dried as and when the water table become declined. The reduction in yield was estimated as 80% due to irrigation water shortage and 20 % due to high evaporation rate in terms of high temperature. From the survey it is evident that the drought during the year effected the yield and social life of the farmers.

Key words: Drought, survey, orchards, Balochistan.

Introduction

Drought is a multi faceted concept which defies attempts at precise and objective definition. This ambiguity causes confusion and indecision, resulting in either inaction or ad hoc response which do not fully consider the complexity, long term ecological and socio-economic interaction associated with water shortage Wilhite & Glantz(1985). Drought is an inevitable part of normal climate fluctuation and should be considered as a recurring, albeit unpredictable environmental feature. The beginning and end of a drought are hard to recognize because drought is a gradual phenomenon. The effect of drought often accumulates slowly when a dry period begins and may linger often expected rainfall patterns have resumed.

In a broad sense drought in agriculture is defined in terms of when water deficits limited vegetation production. From an agricultural perspective a drought occurs when low soil moisture causes extreme plant stress, wilt, and lower grain yield Carr (1966). By definition it integrates the timing and amount of precipitation with plant water demand and available soil water. These considerations led Palmer (1968) to develop the Crop Moisture Index (CMI). Drying of the top soil layer therefore is considered an early indicator of yield loss.

Balochistan is the largest producer of deciduous fruits in Pakistan, has an area of 125,257 hectares, produces 14,16,174 tons of fruits annually GOB, (1999). From horticultural point of view, it can legitimately be called as the " Fruit Basket of Pakistan". Chaudhry (1994) reported that only Balochistan shares between 35 to 80 percent of the gross country production in deciduous fruits. In Balochistan the drought from 1998 to 2000 effected not only the rangeland due to which the mortality in animals i.e., sheep and goats increased but also effected the fruit orchards to a great extent. Most of the trees became dried and thus a huge loss to the farmers occurred, approximately 23 % of the fruits plants were uprooted.

The main and severe affect of drought is to eliminate root growth, so affects the fruit formation both in size and yield. Major fruit crops have some critical times for watering, and if the water is not provided on these situation, the fruit may not attain size as needed by the growers or end users. In drought condition, the water table becomes low and farmers bears

extra burden to reach to water level. In areas like Balochistan where recharge rate of the sub-soil water is low, the longer terms sustainability of crop production based on tube-well water is becoming questionable. The situation is particularly serious in dry areas of this province where natural precipitation is low. Most of the orchards became dry due to high intensity of drought. The recent drought affected the whole fruit industry in Balochistan and reduced its production capacity considerably. The objectives of the study was to find out the effect of scarce water on the yield of fruits.

to compare the production of fruits in scarce water condition with that of previous years to study the losses in production due to drought situation.

Materials and Methods

A survey was launched in Highland Balochistan in early November, 2000. The area has been divided into two sites namely Southern Highland Balochistan and Northern Highland Balochistan. S.H.Balochistan includes Quetta south, Mastung, Kalat and Khuzdar, while N.H.Balochistan comprises Quetta north, Pishin, Killah Abdullah, Ziarat, Loralai, Zhob and Killa Saifullah. All of the districts were purposively selected for the survey to get a better representation of the sample areas, (38%) fruit growers from S.H.Balochistan and (62%) from N.H.Balochistan were randomly selected. Thus in all 116 fruit growers were chosen for the purpose of data collection.

Before conducting a formal survey, a questionnaire was developed and circulated in early November, 2000. Agricultural economist from AERU and AZRC conducted an informal survey, followed up with a formal survey in late November in study areas. However to minimize the error, at the beginning of each interview, a detailed explanation was given to the respondents about the primary aim and objective of the study, so great care was taken to collect reliable information regarding the "Effect of drought on the performance of major fruits during 2000, in Highland Balochistan. The value per kg of all the fruits were calculated on the basis of farm gate price.

The data was statistically analyzed and the standard deviation was calculated. The distribution of farm size was indicated in Table 1 while the trees effected from drought and the expected losses in percentage basis were shown in Table 2 and 3 respectively. The per acre expected loss of sample fruits

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Table 1: Sample distribution by location and farm size of the fruit growers in the study area

Farm size groups	Southern Highland Balochistan	Northern Highland Balochistan	Over all Highland Balochistan
Farm size groups	9.09	54.17	31.63
Small (1-10 Ac)	56.82	30.56	43.69
Medium (11-50 Ac)	34.09	15.27	24.68
Large (51 & above)	400.00	100.00	100.00

Survey results, 2000-2001

Table 2: Average number of trees effected from drought among the fruit growers in Highland Balochistan

Location	Effected trees	Age of trees	Dead tree	Removed trees	Total dead trees
S. Highland Balochistan					
#	44	44	44	44	44
Mean	425.91	10.72	122.23	188.27	242.38
SD	894.79	09.58	220.49	256.00	278.72
N. Highland Balochistan					
#	72	72	72	72	72
Mean	305.98	18.25	188.59	195.60	240.98
SD	349.33	1967	259.80	316.50	288.78
Overall H. Balochistan					
#	116	116	116	116	116
Mean	353.73	15.25	162.88	191.36	241.54
SD	665.09	15.92	246.03	289.07	283.50

Survey results, 2000-2001

were indicated in Table 4. While the Table 5 mentions the farm gate prices of major fruits. It shows that the majority of the growers (43.69%) were medium sized followed by small sized (31.635) and large sized (24.68%).

Results

Water supplies and karez/spring situation: During recent drought the irrigation interval has been changed for every 21.46 (normally 9.54 days) and 23.70 (normally 6.10 days) with the standard deviation of 13.10 and 6.10 both for tube-wells and karez/spring respectively. The results revealed that due to shortage of water in the areas for fruits orchards, the growers irrigate their fruits tree in S.H.Balochistan after every 23.35 (normally 10.49 days) and 27.00 (normally 8.72 days) with the standard deviation of 9.00 and 8.72 days for tube-well and karez/spring respectively. As the ground water was the only source of irrigation available to the growers of study

area, an insignificant change was reported in number of irrigation applied during 2000 as compared with previous year. An inter-sites comparison revealed that S.H.Balochistan was found as most adversely effected area in terms of water shortage.

The major areas of Balochistan are suffering from the century worst drought. Overall highland Balochistan is facing severe drought.

Trees effected from recent drought: Data revealed that overall mean of the dead trees were 240.98 with the standard deviation of 233.78 which accounts 23 % of the total bearing trees in the target area. The mean dead trees were 242.38 and 240.98 with the standard deviation of 278.72 (Table 2) and 288.78 for S.H.Balochistan and N.H.Balochistan respectively. The mean dead trees in S.H.Balochistan are found bit higher than N.H.Balochistan.

Fruit production losses during-2000: The economy of the province largely depends upon the production and exports of fruits in the region. Due to the effect of drought, the major fruits orchards and their yield potential has considerably declined. Unfortunately like other crops, livestock and ranges are also found the victims of the recent drought. The fruit growers yield estimates for two years, in general, reflect the production conditions. Estimates for 2000 were found the lowest as compared with the previous years or expected production. The analysis assessed production variability between the two years (99 & 2000). The production of major fruits implicit that the expected production was more higher when compared with the results of recent year, 2000.

Fruit losses per acre: The severe drought with high intensity which occurred in recent years, resulted in a great production losses to growers in Highland Balochistan. The main and severe affect of drought is to eliminate root growth, so effect the fruit formation both in size and yield. The data indicates

Table 3: Overall production and expected losses (%) of the major fruits by the sample fruit growers in highland Balochistan

	Southern H/Land Balochistan			Northern H/Land Balochistan			Overall H/Land Balochistan		
	Excepted prod. (kg)	Actual prod. (kg)	Losses (%) (E-A)/E*100	Excepted prod. (kg)	Actual prod. (kg)	Losses (%) (E-A)/E*100	Excepted prod. (kg)	Actual prod. (kg)	Losses (%) (E-A)/E*100
Apple	559742.93	20341.24	63.66	45001.03	12138.34	73.02	49609.02	15536.51	68.68
Grape	2540.00	2163.00	14.48	4240.00	4164.33	33.26	5711.43	3878.43	32.09
Almond	733.33	456.11	37.80	1156.30	389.88	66.28	1017.81	437.79	53.45
Cherry	1503.10	861.30	42.70	590.00	565.00	65.25	1420.09	834.36	41.25
Apricot	3755.26	1759.09	43.16	8306.05	3580.59	56.89	5980.09	2649.60	55.69
Plum	6279.69	4189.69	33.28	3852.00	1185.00	69.24	5956.00	3789.07	36.38
Pomg.at	3657.50	1943.75	46.86	3200.00	1750.00	43.31	3444.00	1853.33	46.19
Peach	8314.50	6143.50	26.11	4687.50	1425.00	69.60	7710.00	5357.08	30.52

Survey data, 2000-2001

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Table 4: Production and expected losses (%) /acre of the major fruit by the sample fruit growers in Highland Balochistan

	Southern H/Land Balochistan			Northern H/Land Balochistan			Overall H/Land Balochistan		
	Excepted prod. (kg)	Actual prod. (kg)	Losses (%) (E-A)/E*100	Excepted prod. (kg)	Actual prod. (kg)	Losses (%) (E-A)/E*100	Excepted prod. (kg)	Actual prod. (kg)	Losses (%) (E-A)/E*100
Apple	2333.42	1060.36	54.56	6490.93	2438.96	62.43	4679.73	1838.38	60.72
Grape	3707.00	2649.23	28.53	4591.68	2197.62	53.23	4808.81	2257.81	53.05
Almond	994.85	456.11	54.15	855.00	389.88	54.40	903.65	452.24	49.95
Cherry	2074.72	861.30	58.49	590.00	565.00	04.24	1950.99	342.38	82.45
Apricot	2789.49	1604.49	42.48	2573.99	932.48	63.77	2677.58	1255.54	53.11
Plum	2306.24	1020.98	55.73	4260.00	775.00	88.85	2532.33	889.95	64.50
Pomg.at	2290.84	1548.34	32.41	2374.12	1345.24	43.34	2327.27	1459.48	37.29
Peach	2518.07	1247.57	50.46	2824.37	884.81	68.67	2565.19	1195.75	53.41

Survey data, 2000-2001

Table 5: Farm-gate prices of major fruits in Balochistan

Major fruits	Price/ kg (Rs)	Production (kg)	Value (Rs)	Price / kg (Rs)	Production (kg)	Value (Rs)	Losses (%)
Apple	16.25	49609.02	806146.58	12.26	15536.51	190477.60	76.37
Grape	19.50	5711.43	111372.89	24.37	3878.43	94517.34	15.13
Almond	60.00	1017.81	61068.60	55.50	437.79	24297.35	60.21
Cherry	56.19	1420.09	79794.86	77.66	834.36	64796.40	18.80
Apricot	11.91	5980.09	71222.87	14.27	2449.60	37809.79	46.91
Plum	07.90	5956.00	47052.4	10.19	3789.07	38610.62	17.94
Pomg.at	18.97	3444.00	65332.68	24.45	1853.33	45313.92	30.64
Peach	12.97	7710.00	99998.70	12.26	5357.07	65677.80	34.32
Total							37.54

Survey Results, 2000-2001

that overall losses for all major fruits were 56.81 %. According to inter-sides calculation the losses were higher in N. H. Balochistan (54.87%) than S.H. Balochistan (47.06%). The growers at N. H. Balochistan were the most affected ones due to more shortage of irrigation water.

Gross revenue losses 2000: The acute water shortage resulted in great revenue losses to growers in Highland Balochistan. In the absence of update data, the losses of fruits for the previous year was used to estimate growers gross revenues. On the economic sides, different farm prices compound the differences in the losses in gross revenues in the region. Total province (Highland Balochistan) losses in fruits gross revenues were 37.54% The losses in apple gross revenues were 76.37 %, which was highest among the others major fruits in the target areas. The losses reflects shortage of water availability occurred during May-August at the time of fruit maturity stage. The share of total losses for grape 15.13 %. while cherry and apricot accounted for 18.80 and 46.91 % of the fruits gross revenues losses. Thus, the total estimated fruits losses per sample grower were Rs. 780,488.75 in Highland Balochistan.

Discussion

The survey results indicated that overall mean farm size was 79.59 with the standard deviation of 261.33 acres. The mean farm holding were 160.82 and 29.96 acres with the standard deviation of 407.60 and 58.35 acres in S.H. Balochistan and N.H. Balochistan respectively. The growers allocated over 11.81 percent of their operational holdings to fruit production during 2000 with the standard deviation of 22.71 percent. The mean holding were 11.86 and 11.78

with the standard deviation of 24.05 and 26.77 acres in S.H.Balochistan and N.H.Balochistan respectively. The proportion of the areas is bit higher in N.H. Balochistan as compared with S.H.Balochistan. This is mainly due to more water availability in addition to better climatic conditions etc. A comparison of the gross revenues of the highland Balochistan is presented below. In the region, the estimated fruits gross revenues 1999 as base year were Rs. 155.67 million compared with estimated gross revenues of the current year, which were Rs. 65.13 million. So the region losses in fruits gross revenues were Rs. 90.54 million (losses per grower were Rs. 780,488.75 x total number of farmers) excluding multiplier effect.

References

- Chaudhry, A. Shamim and Sahibzada, 1994. Agriculture development in Balochistan, challenges, prospects and policy options. J. Econ., 1:11-23.
- Carr, J. T., 1966. Texas droughts, causes classification and prediction. Report No. 30. Texas Water Development Board, Aus., Tex.
- Government of Balochistan, 1999. Agricultural Statistics of Balochistan, 1996-97. Statistical Wing, Directorate General of Agriculture Department Balochistan, Quetta.
- Palmer, W.C., 1968. Keeping track of crop moisture conditions nationwide: The new crop moisture index. Weatherwise, 21:156-161.
- Survey Results, 2000-2001.
- Wilhite, D.A. and M. H. Glantz, 1985. Understanding the drought phenomenon: The role of definitions. Water int., 10:111-120.