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The Effect of Planting Dates on Yield Performance and Blight Incidence of Two Potato (*Solanum tuberosum* L.) Cultivars At Adet

Tesfaye Abebe and Anteneh Abewa
Adet Agricultural Research Center, P.O. Box 8, Bahir-Dar

Abstract

The use of environmentally safe optimum agronomic packages is one of the ways through which sustainable crop production is attained. To this effect two potato cultivars were tested on different planting dates for two consecutive years (1988-1989) at Adet to see their yield and reaction to disease. The trial was laid out in a split-plot design with five different planting dates at fifteen days interval and two potato cultivars (AL-624 and local cultivar), the former being assigned to the main plot while the latter to the sub-plot. The result indicated that there is significant difference in yield and disease incidence among the cultivars over the tested planting dates. The yield of the last planting dates was comparatively low with high disease score. On average a yield reduction of 31 kg/day was recorded for AL-624 planted after June first while 15 kg/day for local cultivar planted after May fifteen. It was also observed that yielding level apparently varied among potato cultivars. The cultivar AL-624 gave the highest yield almost in all planting dates considered than the local cultivar. Hence, although fixed date recommendation in planting time is not practical, planting susceptible cultivars early May to mid May while moderately resistant cultivars early May to early June depending on the onset of rain is the appropriate time for higher yield harvest with low disease incidence while delaying will result in high disease incidence at the earlier crop growth stage and lower yield as a consequence.

Introduction

Cultivars are known to vary in their response to planting time. This could be due to their genetical reaction to the environment under which they are grown. Potato is seriously affected by the planting time for it is grown mostly by the farmers in the rainy season where favourable conditions prevail for the development of the devastating disease of the crop, i.e, late blight of potato.

Farmers in the Adet region plant potato earlier in the season to escape the incidence of late blight. In some areas this practice exposes the crop to early-stage moisture stress for which the crop is very sensitive and may result in yield reduction.

Planting date trial conducted at Ambo indicated that early planting delayed the onset of the disease with its slow rate of development accompanied by higher tuber yield while the opposite was true for late planting (2). However, because of climatic (temperature and rain fall) variations and varied response of cultivars, the planting time is different in different regions (1). No information is available in this line in the Adet region despite the large area covered by the crop. Therefore, this trial was conducted with an objective of determining response of cultivars to different planting dates and identify their appropriate planting time with a minimum level of disease development and thus higher tuber yield.

Materials and Methods

The trial was conducted for two consecutive years (1988-1989) at Adet Research Center using two potato varieties and five planting dates. The two varieties were AL-624 and a local cultivar. The planting dates were May 1, May 15, June 1, June 15 and July 1. These treatments were arranged in a split-plot design in four replications. The varieties and planting dates were assigned to the sub-and main plots, respectively.

Sub plot size was 13.5 meter square (3 m x 4.5 m) with four rows per plot, giving a spacing of 75 cm between rows and 30 cm between plants in the row. Fertilizer was applied at the rate of 54 kg/ha N and 138 kg/ha P₂O₅ (300 kg DAP/ha) at planting. Other cultural practices were carried out as necessary. Rainfall, air temperature and relative humidity for the growing seasons were recorded. At harvest, yield was determined from the middle two rows. A combined analysis of variance was computed for tuber yield.

Results and Discussion

The highest yield for AL-624 was recorded in 1988 and for the local in 1989. This was due to the good rainfall distribution and the impact of storage condition, respectively. The highest yield of 176.12 q/ha was harvested from variety AL-624 planted on May first, 1988. Equally, the second highest yield of 156.10 q/ha was also obtained from the same variety planted on June first, 1988 (Table 1). Average over cultivars for date of planting shows that as planting was delayed the yield declined (Table 1). When potato was planted early in the season vegetative growth was better with good stand percent and delayed onset of disease (Table 2). This suggests that when planting is delayed the plant is exposed to unfavorable environmental condition that affect its performance. Table 2 also shows that as planting was delayed the number of plants tended to decrease. Reduced number of plants in late planting dates could also be due to low temperature associated with high relative humidity which might have created a favourable condition for disease development beginning at the earlier crop growth stages (Table 3).

Statistically significant differences were found between the mean yield of the two varieties as well as between the different planting dates during both years (Table 1). The interaction between varieties and planting dates was also found to be highly significant. The variety AL-624 gave the highest yield almost in all planting dates than the local cultivar (Table 1). This is due to its genetic potential for yield.

In conclusion, it is advisable to plant susceptible cultivars of potato from May 1 to May 15. On the other hand, planting of moderately resistant/tolerant varieties may be extended to June 1.

Plantings delayed beyond recommended periods will result in increased incidence of disease and lower tuber yield.

Table 1. Tuber yield (q/ha) of two potato cultivars as was influenced by planting dates

1988						
Cultivar	May 1	May 15	June 1	June 15	July 1	Mean
AL-624	176.12	150.15	156.10	76.03	47.03	121.09
Local	29.71	48.96	36.65	13.85	1.81	26.20
Mean	102.92	99.56	96.38	44.94	24.42	
LSD at 1% for varieties		= 11.3				
LSD at 1% for dates		= 21.1				
1989						
	May 1	May 15	June 1	June 15	July 1	Mean
AL-624	104.77	90.86	82.82	67.20	42.97	77.72
Local	84.58	73.06	20.58	15.78	12.92	41.38
Mean	94.68	81.96	51.70	41.49	27.95	
LSD at 1% for varieties		= 9.30				
LSD at 1% for planting dates		= 32.54				

Table 2. The effect of planting dates on agronomic characteristics of two potato cultivars (1988-1989) and disease score of late blight

Cultivar	Dates	Stand (%)	Plant ht. (cm)	AUDPC		Mean tuber Yield (Q/ha)
				1988	1989	
AL-624	May 1	82.50	61.00	56	332.5	140.4
	May 15	98.50	65.00	63	336	120.5
	June 1	90.50	59.00	75	308	119.4
	June 15	92.25	53.00	171.5	409.5	71.4
	July 1	85.75	47.00	98	273	45.0
Local	May 1	84.75	44.00	101.5	353.5	57.1
	May 15	97.00	51.00	105.5	364	61.0
	June 1	92.75	46.00	110.5	395.5	28.6
	June 15	100.00	36.00	213.5	441	14.8
	July 1	72.25	38.00	98	290.5	7.3

AUDPC - Area under disease pressure curve

Table 3. Rainfall, temperature and relative humidity data for the two growing seasons

Month	Temperature (°C)			Rainfall (mm)	Relative humidity (%)
	Min.	Max.	Ave.		
1988					
May	11.2	28.8	20.0	58.3	48.6
June	11.9	25.2	18.6	208.6	64.1
July	11.9	21.7	16.8	392.6	80.4
August	11.2	22.5	16.9	270.2	78.1
Sept.	10.4	23.2	16.8	166.8	73.8
Oct.	9.3	23.4	16.4	129.5	62.9
1989					
May	10.8	27.1	18.95	76.8	51.6
June	9.5	25.7	17.6	77.4	61.7
July	28.3	22.8	15.6	385.0	76.2
August	8.3	22.9	15.6	261.9	67.5
Sept.	7.8	23.5	15.7	148.7	57.8
Oct.	6.7	24.3	15.5	123.0	44.5

References

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