

Effect of improvement of soil's physical and chemical characteristics on quality of potato

Farnoosh Jafari

Agricultural educational center Ardabil, Iran

Corresponding author: Farnoosh Jafari

ABSTRACT: Potato is an important global food source and one of the most important sources of starch. Interaction between physical and chemical characteristic is important source of variation in any crop including potato, so in this experiment one cultivar of potato cv Draga was studied on factorial design on the base of randomized complete block design in four replications in Ardabil, Iran. Some parameters such as percent of starch, percent of dry matter and the size of tuber were evaluated. Farmyard manure were placed in four levels 0, 15, 30, 45 ton/ha in main plots, and in second plots, there were two levels with and without subsoiling. Effect of subsoiling for all measured traits was insignificant, and subsoiling with farmyard manure has no interaction for all measured traits too. Result analyses of variance of data indicate that there is significant difference between farmyard manure with percent of dry matter and percent of starch. There is no significant difference between farmyard manure with tuber size, no correlations between all of experimental qualitative factors.

Keywords: Dry Matter, Farmyard Manure, Potato, Starch, Subsoiling

INTRODUCTION

Potato is an important global food source and one of the most important sources of starch. Potato starch has a superior quality and its many interesting properties make it attractive for application and show the importance of potato consumption in our diet. (Tuncturk and ciftci, 2005) reported positive and significant relationship were found among percentage of medium size and big tubers, dry matter content and starch content of the tuber. Starch is isolated from numerous tuberous plants and cereal grains as well. Undoubtedly, starch in potato is the most important matter. Starch content of potato tubers varied among different cultivars and physical and chemical condition. (Khayatnezhad et al., 2011) reported stronger positive and significant correlations between starch content and dry matter content. (Hasandokht, 1996) reported that using of 30 ton/ha farmyard manure produced the most amount tubers which have 35-45 mm diameter. Also, he showed that manure had negative effect on percentage of dry matter whereas increased manure cause to increase dry matter yield.

MATERIALS AND METHODS

This study was done in Ardabil research station and some of geographical and climatic characteristics of experimental site were given in table 1.

Table 1. Geographical and climatic characteristics of experimental site

Altitude from Sea level	Longitude (Eastern)	Latitude (Northern)	Annual Rainfall average	Maximum temperature average	Minimum temperature average
1350m	48°20'	38°15'	310.9mm	15.8 (c°)	1.98 (c°)

Before planting, soil of field analyzed and the result were shown in table 2

Table2. some of soil's physical and chemical properties used in this experiment

Depth cm	Soil texture	Silt%	Sand%	Clay%	s.p%	Organic mater%	Ec mmoh/cm	ph
0-30	Silty clay	30	38	32	57	1.3	0.8	8.2
30-60	Clay	40	20	40	64	0.7	0.9	8
60-90	Clay	40	15	45	67	0.5	0.9	8

Tillage operation conducted with and without subsoiling in autumn in previous season. Experimental design was factorial based on complete randomized design with four replications with two factors that, the first factor included 4 levels of farmyard manure (0, 15, 30, 45 ton/ha). The second factor was tillage operation included subsoiling and without subsoiling. Tubers were planted with 15 cm distances between rows and 25 cm in row, the area of each block was 18 m² and the average weight of each tuber was 50 gr.

All of practices such as irrigation (6 times) and control of weeds (3 times), earthing of plants were done regularly during growth season 140 days after planting, tubers harvested and 10 plants were selected from each blocks separately. After harvesting, traits were measured such as percent of dry matter, percent of starch, tuber size. Analysis of variance and the means comparisons with Duncan test was done by MSTATC software and linear correlation coefficients between traits by spss software.

Table 3. Analysis of variance of evaluated traits in potato

S.O.V	df	Dry matter%	Yield of dry mater t/ha	Starch%	Tuber size 28-35mm	Tuber size 35-45mm	Tuber size 45-55mm
Replication	3	0.253 ^{ns}	0.193 ^{ns}	0.111 ^{ns}	0.644 ^{ns}	1.525 ^{**}	0.168 ^{ns}
Subsoiling (A)	1	0.061 ^{ns}	0.001 ^{ns}	0.011 ^{ns}	0.578 ^{ns}	0.500 ^{ns}	0.168 ^{ns}
F M (B)	3	0.782 [*]	0.260 ^{ns}	1.423 ^{ns}	0.299 ^{ns}	0.180 ^{ns}	0.037 ^{ns}
AxB	3	0.335 ^{ns}	0.203 ^{ns}	0.118 ^{ns}	0.024 ^{ns}	0.136 ^{ns}	0.240 ^{ns}
Error	21	0.291	0.203	0.392	0.280	0.221	0.148
C.V (%)	-	3.33	13.97	7.78	13.48	19.86	23.01

: Significant at 5% probability level, *: Significant at 1% probability level, ^{ns}: no Significant

Table 4. Mean comparison of different FM on qualitative characters of potato

Treatments	Dry matter % comparison			Starch % comparison		
	Mean	5%	1%	Mean	5%	1%
Farmyard manure						
M ₁	16.68	A	A	8.625	A	A
M ₂	16.1	B	AB	7.900	B	AB
M ₃	15.83	B	B	7.625	B	B
M ₄	16.25	AB	AB	8.05	AB	A

RESULTS AND DISCUSSION

From the data given in table 3, subsoiling has no effect on tuber size, dry matter and starch. The interaction between subsoiling and farmyard manure has no effect on experimental traits too. Analysis of variance showed that there was significant difference between number of tuber per plant and tuber size (28-35mm). The greater tuber per plant, the smaller tubers size average and in this experiment tuber with 28-35 mm diameter were the most per plant.

As shown by table 3 there was a significant difference between treatment at 5% probability level by using of farmyard manure. As would be expected, and concluded from the other researchers, percent of dry matter was decreased prolonged with farmyard manure increasing. According to table 3, the greatest dry mater was in 0 ton/ha (16.68 ton/ha) farmyard manure, and the least dry matter was in 30 ton/ha (15.92 ton/ha).

There was a significant difference and positive correlation between total yield and dry matter yield at 5% probability level. Results reported by Hasandokht are in accordance with our observations.

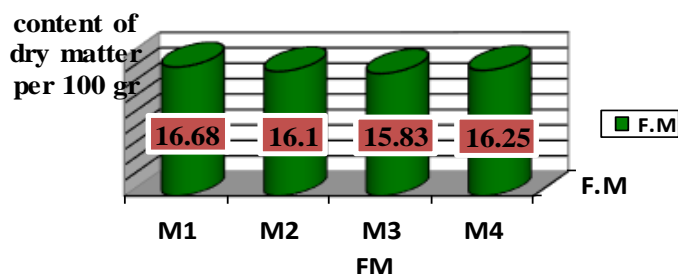


Figure 1. Effect of different level of farmyard manure on dry mater percent

There was significant difference between farmyard manure with percent of starch as shown by the table 3 at 0 ton/ha was the highest (8.625%) and the least percent of starch was 7.625% at 30 ton/ha manure. Correlation between percent of starch and percent of dry matter was positive and significant that show close relationship between two factor, because starch is one of the component of dry matter.

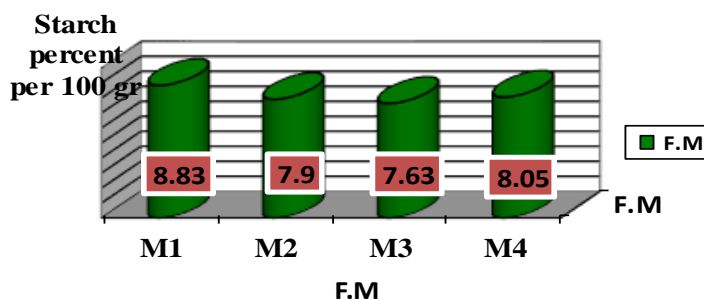


Figure 2. Effect of different level of farmyard manure on Starch percent

CONCLUSION

The results showed that cultivar Zan in terms of all germination indices had the highest average. The study on the concentrations of salinity also showed that water in normal conditions except the germination average index in all indices achieved the highest average.

REFERENCES

- Anamika RP Singh. 1996. Effect of planting data and fertilizers on the crop raised from sports and seed tubers, Journal of the Indian potato Association, 23:1-2, 81-84.
- Barka K. 1984. Two - year action of organic fertilizers on potato crop, yield and starch of tubers and their infestation by streptomyces scabies, field crop abstr. 42(1).
- Burton WG. 1989. the potato, third edition, 472pp Hasandokht M. 1996. Effect of Nitrate Fertilizer and Farmyard manure on qualitative characteristics of potato. MSc thesis. Agriculture faculty. Tehran University.
- Holmstrom DA,MR carler.2000. Effect of subsoil tillage in the previous crop year on soil loosening and potato yield performance, Canadian Journal of plant science 82: 161-164.
- Hoseinzadeh AA. 1996. Effect of different plantings date on qualitative and quantitative characteristics of selective potato cultivars in Ardabil. MSc thesis. Agriculture faculty.Tehran University .

- khayatnezhad M, shahriari R, Gholami R, Jamaati-e-somarin S, zabihi-e-Mahmoudabad R. 2011. Correlation and path Analysis between yield and yield components in potato (*solanum tubersum* L). Middle-East Journal of scientific Research 7(1): 17-21.
- Kasraei R.1993. Organic and chemical fertilizers. Agriculture faculty. Tabriz University. Iran Rashidi R.2004. Effect of plant spacing and seed tubers size on yield and component of potato cultivars. J. Modern science in Agri: 5(16): 19-26.
- Tunçturk M, ciftci .2005. selection criteria for potato (*solanum tuberosum* L.) breeding, Asian Journal of plant science 4(1): 27-30.