

Response of four Potato Cultivars to Soil application with organic and amino acid compounds

Abdel-Monnem Sadalaha Kahlel

Technical Agricultural College, Iraq

A field experiment was implemented at Vegetable field, Department of Plant Production, Agricultural Technical College, Mosul, Iraq during spring season of 2018 to study the response of four potato cultivars (Actrice, Arizona, Riviera and Universa) to four organic and amino acid compounds (Azomine 4 ml/l, Tecamin Max 3 ml/l, Delfan plus 3 ml/l and Humibest 4 g/l) as soil application. These compounds were applied near the plant roots three times, the first after complete tubers emergency 45 days after planting, the second after 60 days and the third after 75 days of planting. The four potato cultivars were sown on 1st February in loamy soil, sprouted seed tubers were planted at 25 cm apart within the row. The treatments were arranged incomplete randomized block design with three replicates. The area of each plot was 6.75m² (3linex3m long x 0.75 m wide). All experimental areas received the recommended dose of organic and mineral fertilizers. Samples of three plants from each treatment and each plot were randomly taken after 90days of planting and growth characters recorded were plant length, shoot number, leaf area, fresh and dry weights of shoots/plant. The total chlorophyll content in fully expanded leaves after 80 days of planting was measured as SPAD units using Minolta Chlorophyll Meter (model SPAD 502). Tubers under all treatments were harvested 110 days after planting and the following parameters were recorded:

Number of tubers per plant

Average weight of the tuber (g)

Average volume of the tuber (cm³)

Plant yield (g)

Tubers total yield per unit area (t/ha)

Tubers marketable yield (t/ha)

Samples of tubers were taken at harvesting for their quality measurements:

Tubers dry matter percentage

Tubers hardness (kg/cm²) was measured by Pressure Tester

Tubers starch % was calculated according to the formula as under:
Starch (%) = 17.546 + 0.891 (Tuber dry matter % - 24.18)

The mineral contents were estimated using the wet ash procedure for the dry powdered.

Nitrogen was determined using modified micro-Kjeldahl according to method of Humphries (1965). Potassium contents were determined using flame photometer according to method of Brown and Lilliland (1964). Phosphorus was determined by modified spectrophotometer method according to Rowell (1993).

The results were statistically analyzed according to the Statistical

Analysis System (SAS) (SAS, 1998) and compared with the means by Duncan multiple range P=0.05 level (Al-Rawy and Kalaf, 2000). The results indicated that Riviera cultivar recorded the highest values of the investigated growth parameters viz., 58.60 cm plant height, 4.91 shoot number, 198.04 g. fresh weight, 42.36 g. dry weights, and 2060.75 cm² leaf area/plant and 42.04 total chlorophyll in leaves. On the country, the lowest values of vegetative growth parameters were found by Actric cultivar. The highest values of vegetative growth parameters (except fresh weight of plant) were obtained with the application of Azomin to the soil.

The effects of interaction treatments between cultivars and organic and amino acid compounds on vegetative growth parameters indicated that the highest values of plant height (60.72 cm), shoot number (5.46), fresh weight (202.5 g), dry weight (44.62 g), leaf area (2122 cm²) and total chlorophyll (43.52) were recorded from the interaction treatment between Riviera cultivar and Azomin compared with other treatments.

Riviera cultivar recorded the highest values of yield parameters of potato i.e. plant tubers number (7.90), tuber average weight (86.19 g.), tuber volume (91.37 cm³), plant tubers yield (680.48 g.) and, total and marketable tubers yields (30.215 ton/ha.).

On the other hand, the highest value of yield parameters (except the average of tuber weight) was from the application of Azomin compared with the other organic and amino acids compounds.

The effects of interaction treatments between cultivars and organic and amino acids compounds on tubers yield parameters showed that the highest values of tubers number per plant (9.43) was from interaction treatment between Arizona cultivar and Azomin and the highest values of average tuber weight (89.56 g) and tuber volume (94.55 cm³) was from interaction treatment between Riviera cultivar and Delfan plus, while highest values of plant yield (705.4 g), total yield (31.319 t/ha) and marketable yield (27.177 t/ha) was from interaction treatment between Riviera cultivar and Azomin.

These results are in agreement with those obtained by Ibrahim et al. (2015) and Youssif (2017) in potato. Aliet al. (2009) and Shabana et al. (2015) found that application of some safe and natural substances improved productivity of tomato crop. Kahlel (2015) also found that addition of bread yeast near the plant roots 4 and 8 g/l led to a significant increase in the number of tubers, average weight of tuber, plant yield, total yield of tubers and marketable yield compared to control treatment.

The effect of cultivars and organic and amino acid compounds on chemical composition of potato tubers reported that Arizona cultivar recorded the highest values of tuber hardness, dry matter %, starch % and P%, while the highest values of N % and K %

were recorded in Riviera cultivar. On the other hand, application of Azomin to the soil increased significantly all the parameters of chemical composition of potato tubers compared with other treatments. Table 7 reveals the effect of interaction treatments between cultivars and organic and amino acid compounds on chemical composition of potato tubers. The highest values of tuber hardness (11.54kg/cm³), dry matter % (24.82), starch % (18.11), N % (2.31) and P % (4.22) were recorded from the interaction treatments between Arizona cultivar and Azomin, while the highest values of K% (2.67) were recorded from the interaction

treatments between Riviera cultivar and Azomin.

It can be concluded from this study that Riviera cultivar is the best compared with the other three cultivars because it recorded the highest values of most growth and yield parameters. On the contrary, applying Azomin as amino acid compounds to the soil increased significantly plant height, shoot number, dry weight of whole plant, leaf area/plant, total chlorophyll in leaves, plant tuber number, tuber average weight, tuber volume, plant tuber yield and total and marketable tuber yield.