EFFECT OF SOME PLANT GROWTH REGULATORS AND POTASSIUM SOURCES ON GROWTH, DEVELOPMENT AND NUTRIENT UPTAKE IN POTATO (*Solanum tuberosum* L.)

By

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B. Sc. Agric. Sc. (Horticulture), Ain Shams University, 2006
M. Sc. Agric. Sc. (Plant physiology), Ain Shams University, 2012

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ABSTRACT

Ali Said Mohamed Hassen Abo Al –Nagaa: Effect of Some Plant Growth Regulators and Potassium Sources on Growth, Development and Nutrient Uptake in Potato (*Solanum tuberosum* L.). Unpublished Ph.D. Thesis, Department of Agricultural Botany, Faculty of Agriculture, Ain Shams University, 2019.

Two field experiments were carried out at Ahmed Ourabi Agricultural cooperative Association, Cairo-Ismaellia desert road at Kalubia Governorate, Egypt, during winter seasons of 2013/2014, 2015/2016 and 2017/2018. The objective of this study was to evaluate the effect of plant growth regulators [paclobutrazol (PBZ) and mepiquat chloride (MC)] and potassium fertilizers [potassium sulphate (KC), foliar potassium (KF) and rock potassium (KR)] on potato plants growth and productivity.

The results illustrated that application with different sources of potassium (K) singly led to significant increase in plant height, number of branches/plant and leaf area/plant against its combination with growth regulators(GRs) and the reverse was true for shoot fresh and dry weights. Meantime ,there is no influence of K sources applied on number of tubers/plant. A significant increment in tubers number/plant, weight of tubers, tuber diameter and size was achieved with spraying growth regulators combined with K sources comparing with K fertilization treatments singly. It is clear from the interaction that KR+PBZ at 50 ppm achieved significantly positive response in growth characters which reflected on total yield of potato tubers. The values were about 68-75% against the control (KC) during the growing seasons.

The interaction between treatments had influence on the tuber quality aspect studied. Application of GRs led to absence the very small tubers, which diameter between 30-40 mm in both experiments, in addition to increase dry matter production as compared with the

application of K sources singly. The highest percentage of large tubers and dry matter concentration was achieved with KR+PBZ at 50ppm to reach 100% and 54.3-56.1% respectively, at harvest stage during the growing seasons. Meanwhile, application of potassium sulphate (KC) singly at rate of led to dominate small and smallest tubers and recorded the lowest dry matter concentration in the tubers. On the other hand, GRs (both rates) have a positive effect on total chlorophylls, concentration of N, crude protein, P and K, in addition to N,P and K uptake in shoot and tubers of potato plants, against the untreated plants in the three sampling dates (50,85 and 120 DAS). Apart from MC at 300 ppm either with KF or KR after 85 and 120 days from sowing, application of GRs increased the concentrations of starch and vitamin C in the tubers against the control treatment (without GRs) and the reverse was true for the concentrations of reducing sugars and total soluble phenols.

The data clearly showed that KR+PBZ at 50 ppm was the most efficient treatment, since it has a positive effect on growth, development, nutrients uptake, tubers quality and yield productivity of potato plant. While, KF+PBZ at 50 ppm and KR+MC at 150 ppm detected nearly equal influence and ranked as the second order.

Keywords: *Solanum tuberosum*, Potato, Plant growth regulators, Potassium sources, Rock potassium, Paclobutrazol, Mepiquat chloride, Growth and productivity.

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