SUMMARY AND CONCLUSION

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This study included two experiments which were carried out in each of the summer and fall (Nili) seasons of 1996 and 1997 at the Experimental Form, Faculty of Agriculture Moshothor, Zagazig University and Laboratory of the Department of Horticulture in the same faculty.

First experiment was suggested as an attempt to investigate the effect of potassium fertilization rate and application method on the plant growth, yield components , some chemical composition of leaves and tubers as well as storageability of potato cv. Diamant which was included 9 potassium fertilization treatments i.e. 5. soil application at rates (0, 48, 72, 96 and 120 kg K_2O/ fad.) added once 60 days after planting and 4 foliar application treatments i.e. 1, 2 , 3 or 4 sprays, each beside soil addition of 48 kg K_2O / fad. One liter / fad. of potassium solution 36% K_2O was used for spraying potato plants either once (60 days) , twice (60 and 70 days) , three times (60, 70 and 80 days) or four times (60, 70, 80 and 90 days) after planting . This experiment was arranged in a complete randomized block design with four replicates.

The obtained results can be summarized as follows:

1. ***Plant vegetative growth*:** Plant height, number of stems per plant and dry weight of potato leaves, increased with increasing K-fertilization rate. Using 48 kg K_2O / fad. as soil application plus one foliar spray with K_2O solution increased plant height, Moreover using three sprays with K - solution (36%

K_2O) plus the same rate i.e. 48 kg K_2O /fad. (as soil application) increased dry weight of potato leaves . In spite of that number of stems / plant was not significantly affected by K- fertilizer rate and application method. Application of 72 kg K_2O/ fad. as soil application resulted in the highest values in this respect.

2. ***Chemical composition of leaves*:** Using 48 kg K_2O /fad. as soil addition plus spraying plants up till 4 times with K - solution (36% K_2O, one liter / each time) or addition of 120 kg K_2O as soil application significantly increased N, P and K percentages of potato leaves.

3. ***Yield and its components*:** Total yield and its components of potato tubers, e.g. number of tubers/plant, tubers/top ratio and tubers yeild of plant , plot or fad. are increased with increasing K fertilizer rate upto 96 kg K_2O /fad. alone or by using 48 kg K_2O / fad. as soil application plus using three sprays of K-solution (36% K_2O) However, number of tubers per plant was the unique character which was not significantly affected by K-fertilization rate and method of application.

4. ***Physical characteristics*:** Increasing K-fertilization rate up to 96 kg K_2O/fad. alone or using 48 kg K_2O/fad. as soil application plus three times of foliar spray by K_2O solution significantly increased number of medium (36 – 45 mm) and large (over 46mm) sized tubers with decreasing number of small sized tubers (28 – 35 mm). In addition, increasing K-fertilization upto 96 kg K_2O/fad. as soil application or using 48 kg K_2O/fad. plus spraying potato plants twice by K-solution (36% K_2O) significantly

increased dry weight percentage and specific gravity of tubers. Furthermore, feathering was improved by using 96 kg K_2O /fad. alone or 48 kg K_2O / fad. as soil application plus three times of foliar application with K_2O solution.

5. ***Chemical composition of Tubers***: increasing K - fertilization rate developed N, P, K, reducing , non-reducing as well as total sugars, total protein and starch percentages. In this respect using 96 or 120 kg K_2O/fad. alone or 48 kg K_2O/fad. as soil addition plus spraying potato plants four times by K-solution (36% K_2O, one liter per each time) were the best among the tested treatments which resulted in the highest tubers constituents of N, P, K, total protein , starch and reducing , non- reducing as well as total sugars percentages.

6. ***Storageability studies***: Increasing K-fertilization used rate up to 120 kg K_2O/fad. or addition of 48 kg K_2O/fad. as soil application plus four sprays by K-solution (36% K_2O/one liter each time) decreased weight loss percentages but increased all sugar fractions as well as starch contents in the tubers at the end of storage period (90 days). Moreover, using 48 kg K_2O/fad alone improved storageability of tubers parameters such as reducing number of sprouts/tuber with increased number of days for sprouting (13 days as average of both seasons) and tuber dry weight percentage at the end of storage period.

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K_2O/liter / each time / fad.) or using 96 kg K_2O/fad. as soil application only offered good plant growth, yield, physical, chemical composition and storageability of potato tubers and such treatments could be recommended.

Second experiment included 10 treatments which resemple the combination of two plant spacings with five plant growth regulator treatments . This experiment was arranged in a split plot design with three replicates where the plant spacings i.e. 15 cm or 20 cm. were situated in the main plots and growth regulators treatments i.e. CCC at 500 or 1000 ppm, PP_{333} at 25 or 50 ppm beside the control one were randomly distributed in the sub-plots. As for the residual effect of using growth regulators treatments on the production of the subsequent potato planting through Nili seasons, 25 kg of tubers produced from each growth regulator treatments were chosen, and stored at cool-room (4°C) for three months and then planted during mid - September of 1996 and 1997 seasons. This experiment was arranged according to complete randomized block design with four replications.

The obtained results can be summarized as follows:

1. ***Plant vegetative growth:*** Potato plants spaced at either 15 or 20 cm and not treated with any of studied growth regulators proved to be the tallest ones. As for dry matter using PP_{333} at 25 ppm combined with 15 cm spacing increased dry weight content of potato leaves. However, in case of the number of stems / plant, no clear trend could be detected.

medium (36 – 45mm) and decreased that of large size (>46 mm) tubers compared with untreated plants. In this respect, growth regulator treatment of 25 ppm PP_{333} ranked the first , followed by those of 50 ppm PP_{333} and CCC at rate of 1000 ppm. Either 500 ppm CCC or 50 ppm PP_{333} in combination with spacing at 15 cm produced higher total tubers number as average of both seasons (235.7 , 262.4 tubers/ plot), respectively,

5. ***Physical characteristics*:** Dry weight, specific gravity and feathering of potato tubers were not affected by plant spacing. However, such characters were improved by using growth regulators treatments. The combined effect of the two studied factors showed that the tubers dry weight and specific gravity were improved with spacing plants at 15 cm or 20 cm in combination with 500 ppm CCC or 50 ppm PP_{333}.

6. ***Chemical composition of tubers*:** Increasing plant spacing from 15 cm to 20 cm increased most of the tuber chemical composition characteristics of N, P, K, reducing , non-reducing, total sugars, total protein and starch contents. Meanwhile, increasing CCC or PP_{333} concentrations increased N, P, K, reducing, non-reducing and total sugars percentages of potato tubers at harvest time but using 500 ppm CCC or 25 ppm PP_{333} increased total protein and starch tubers contents . Potato plants spaced either at 15 cm or 20 cm in combination with 1000 ppm CCC or 50 ppm PP_{333} increased generally most of the tubers chemical composition characteristics.

7. ***Storageability***: Increasing plant spacing increased number of days for sprouting and decreased the percentage of weight loss during storage period . However, the dry weight content of the tubers and their percentages increased from initial content before storage corresponding at narrow spacing . Meanwhile, plant spacing had no effect on number of sprouts / tuber. Although , growth regulators improved all characteristics of storageability e.g number of days for sprouting, number of sprouts/ tuber and dry weight at the end of storage period, using either CCC at rate of 500 ppm or PP_{333} at rate of 25 ppm showed the best results in this respect . Moreover, either 1000 ppm CCC or 50 ppm PP_{333} resulted in better efficiency on weight loss percentages in this respect. Potato plants spaced either at 15 cm or 20 cm in combination with 1000 ppm CCC decreased percentage of weight loss during storage period. Also, plants spaced at 20 cm in combination with 50 ppm PP_{333} reduced percentage of weight loss and number of sprouts/ tuber with increased number of days for sprouting . However, potato plants spaced at 15 cm in combination with 1000 ppm CCC showed superiority in all sugar fractions in their tubers at storage end . Meanwhile, insignificant effects were obtained in case of starch content.

8. ***Residual effect*** : All used growth regulator treatments which were sprayed on potato foliage during the early summer seasons affected the total yield as well as number and weight of tubers/ plant of the subsequent Nili planting . Moreover, using

CCC at rate of 1000 ppm during summer planting as foliar application showed the most favourable effect on yield and its components, during Nili seasons. Regarding the residual effect on tubers size, spraying either CCC or PP_{333} used concentrations at summer seasons increased medium (36 -45mm), large (>46mm) size and total tubers number / plot compared with the untreated plants. However, CCC treatments were more effective than those of PP_{333} in this respect. Obtained results during Nili planting showed opposite trend than those of summer season in this respect.

Generally, it may be concluded that using plant spacing at 15 cm in combination with foliar sprays three times after 60, 70 and 80 days from planting with either 500 ppm CCC or 25 ppm PP_{333} may be recommended . Such treatments are advisable as the highest total yield as well as number of seed sized tubers with best physical and chemical properties of their tubers after storage period could be obtained. Moreover , the tuber yield as number and weight / plant of subsequent (Nili) plantings increased with growth regulator treatments than with that of control one as the residual effect of such treatment. Cycocel at 1000 ppm was the most effective treatment in this respect.