

Physiological studies on some annual plants

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The present investigation was conducted during two successive seasons of 1994/95 and 1995/96 at the Experimental Station of the Faculty of Agriculture at Moshtohor, Zagazig University Benha Branch. The experimental designs were in complete randomized block system. Three main experiments were conducted to study the effect of tartaric acid, aloe extract on seed germination, vegetative growth, flowering and chemical composition of *Delphinium ajacis*, L. 2- *Antirrhinum majus* J- *Callistephus chinensis*; Also, the study included the effects of Paclobutrazol, Amino-cycimic acid and pinching on the vegetative growth, flowering, root system and chemical composition in the leaves. The first experiment This experiment was aimed to study the effect of Aloe extract at 25, 33.3, 50 or 100 % and Tartaric acid at 2 or 4 % on the seed germination under the Lath house (green house) or laboratory room temperatures. The second experiment In this experiment, the study concerned the effects of aloe extract or Tartaric acid at different concentrations on the vegetative growth, flowering and chemical composition. The third experiment This experiment concerned the study the effects two growth retardants (PP-333, A- Rest) applied as sprays at different concentrations 0, 25 and 50 ppm and a pinching treatment on the *Delphinium ajacis*, L., flowering, root system and chemical compositions and pinching treatment. The most important results obtained were: The first experimental 1- *Delphinium ajacis*, L.- Soaking seeds on aloe extract at 100, 33.3 % concentrations increased germination percentage comparing by control I and 2.- Soaking seeds on aloe extract at 100, 33.3 % concentrations gave the highest germination percentage as 100 % in petri dishes and clay pots. 81- Soaking seeds on Tartaric acid at 4 % concentrations gave the maximum germination percentage as 100 % in petri dishes but decreased germination percentage in clay pots. Soaking seeds in aloe extract at 25, 50 % concentrations gave the maximum rate of germination. All treatments of aloe extract and Tartaric acid at 4 % concentrations gave the maximum rate of germination in petri dishes and clay pots. 2- *Antirrhinum majus*, L.- Soaking seeds on aloe extract at 50, 100 % concentrations gave the highest germination percentage in petri dishes and clay pots comparing by control. Soaking seeds on Tartaric acid 2, 4 % decreased the percentage of germination in both seasons. Soaking seeds on aloe extract and Tartaric acid had no influence on the rate of germination. 3- *Callistephus chinensis*, L.- Soaking seeds on aloe extract at 50, 100, 25 % concentrations significantly increased the germination percentage as compared to the other treatment in petri dishes and clay pots. Soaking seeds on Tartaric acid at 4 % gave the minimum germination percentage in both seasons of petri dishes and clay pots. Soaking seeds on aloe extract at 50, 100 % concentrations gave faster emerging compared with the other treatments. The second experimental 1- *Delphinium ajacis*, L.- A- 1- The vegetative growth characteristics of the seedlings from the soaked seeds. Aloe extract at 50, 100, 25 % concentrations significantly increased the length of plant comparing by control. Tartaric acid at two concentration (2, 4 %) gave the shortest plants. All concentration of aloe extract significant increased the number of branches/plant especially at 50 or 100 % and control plants gave the minimum number of branches/plant. Aloe extract at 100 or 50 % increased the fresh and dry weights of leaves. Tartaric acid at 2 or 4 % produced the least fresh and dry weights of leaves in both season. 82- Aloe extract at 100, 50 % significant increased the leaf area while Tartaric acid at 2 % and control decreased the leaf area in two season. A- 2- The flowering characteristics: Aloe extract at 100 % gave maximum length of stalk comparing to other concentration. While Tartaric acid at 4 % gave the shortest length of spike stalk in both seasons. Aloe extract at 100, 50 % significantly

increased the number of florets/spike comparing to other treatments. While Tartaric acid at 2 % or control plant reduced the number of florets/spike. Aloe extract at 100 and 50 % significantly increased the length of inflorescences portion while Tartaric acid at 4 % significantly reduced the length of inflorescences portion/ stalk. All concentrations of aloe extract significantly increased the fresh weight of florets/plant especially at 50 or 100 % concentrations. While Tartaric acid at 4 % significantly decreased the fresh weight of florets/plant.

A-3- Chemical compositions: Aloe extract at 50 or 100 % significantly increased the total carbohydrate. While Tartaric acid at 2 or 4 % significantly decreased the total carbohydrate content. Aloe extract at 100 % significantly increased the N%, P% and K%. While Tartaric acid at (2 or 4%) reduced the N%, P% and K%.

2- Antirrhinum majus, L. B-I- The vegetative growth characteristics: Aloe extract at 50 and 100 % significantly increased plant height while Tartaric acid at (2 or 4 %) reduced plant height in both seasons. Aloe extract at 33.3 % significantly increased the number of branches/plant compared by control. All treatments gave the same trend in this the fresh and dry weights of leaves. Fresh and dry weight were not affected by the treatments. Aloe extract at 100 and 50 % significantly increased the leaf area, while Tartaric acid at 4 % significantly reduced the leaf area.

8-2- The flowering characteristics: Aloe extract at 100 or 50 % significantly increased the length of stalk, while Tartaric acid at 2 or 4 % suppressed the length of the stalk. Aloe extract at 50 or 100 % statistically significantly increased the length of the inflorescences portion/stalk. The fresh weight of florets/plant was not influenced by the treatments.

3- Chemical compositions: Aloe extract at 100 and 50 % significantly increased the total carbohydrate percent, while Tartaric acid at 2 or 4 % significantly decreased the total carbohydrate percent. Aloe extract at 100 or 50 % significantly increased the N% and P% percentage, while Tartaric acid at 2 or 4 % significantly reduced the N% and P% percent. Aloe extract at 100 % significantly increased the K%, while Tartaric acid at 4 % significantly decreased the K% percent.

3- Callistephus chinensis, L. C-I- The vegetative growth characteristics: Aloe extract at 100 and 50 % had statistically significant increases on the plant height, while Tartaric acid at 2 or 4 % significantly reduced the plant height. Aloe extract at 100 or 50 % significantly increased the fresh and dry weights of leaves/plant. Aloe extract at 100 % significantly increased the leaf area, while Tartaric acid at 2 % decreased the leaf area.

C-2- The flowering characteristics: Aloe extract at 100 or 50 % significantly increased the number of flower head. Aloe extract at 100 % increased the length of the flower stem. Aloe extract at 100 % and control plants gave the largest diameter of the flower head. Aloe extract at 25 and 100 % reduced the heavy fresh weight of the head. While control plants and Tartaric acid at 2 or 4 % reduced the fresh weight of the head plant.

C-3- Chemical compositions: Aloe extract at 100 % increased the total carbohydrate percent, while control plants gave least value comparing by Tartaric acid treatments. Aloe extract at 50 or 100 % significantly increased the N and P % percent. While Tartaric acid reduced them. Aloe extract at 100 and 33.3 % significantly increased the K %, in the leaves, while control plants gave the least K %.

The third part:

1- Delphinium ajacis, L. A-I- The vegetative growth characteristics: A-Rest at 50 ppm and PP-333 at 25 ppm significantly reduced the plant height comparing to the other treatments. PP-333 at 25 ppm increased stem diameter significantly compared with control in the first season. A-Rest at 25 ppm increased the number of branches plant compared with control. PP-333 and A-Rest reduced the fresh and dry weights of leaves significantly compared with pinching or control.

A-2- The flowering characteristics: A-Rest and PP-333 at 50 ppm increased the number of stalk/plant in the two seasons comparing with control. Pinching PP-333 at 25 and A-Rest at 50 ppm reduced the length of stalk and the length of inflorescences/protation compared with control. PP-333 and A-Rest increased the number of florets/spike especially, A-Rest at 50 ppm compared to control. PP-333 at 25 ppm, A-Rest at 50 ppm and pinching reduced the fresh and dry weights of florets.

A-3- Root characteristics: PP-333 at 25, 50 ppm and pinching gave the maximum length of root/plant. PP-333 and A-Rest at 25 ppm decreased the fresh and dry weights of roots, while A-Rest at 50 ppm and pinching increased the fresh and dry weights of roots.

A-4- Chemical compositions: PP-333 and A-Rest reduced chlorophyll a, and carotenoid content comparing to pinching, control. PP-333 and A-Rest increased total carbohydrate percentage and the N and P%. PP-333, A-Rest and pinching increased the K % in both seasons especially with 25 ppm of PP-333 concentration.

2- Antirrhinum majus, L. 8-1- The vegetative growth characteristics: PP-333 or A-Rest decreased the

plant height in both seasons, while PP-BI at 50 ppm gave the shortest plant. All PP-333 or A-Rest treatments increased the diameter of the stems significantly especially at the 50 ppm concentration. PP-333 at 50 ppm increased the number of branches A-Rest at 25 ppm gave the maximum number branches/plant followed by PP-333 at 50 ppm comparing to control in the second season. A-Rest at 25 or 50 ppm produced the least fresh and dry weights of leaves/plant in both seasons. PP-333 or A-Rest increased the leaf area especially at 50 ppm concentration in the first season, while PP-333 at 25 or 50 ppm significantly increased the leaf area in the second season comparing to control.

8-2- The flowering characteristics»-PP-333 or A-Rest significantly increased the number of stalk/plant compared in both seasons. PP-333 at 25 ppm was the best concentration for flowering. PP-333 at 50 ppm, A-Rest at 50 ppm reduced the length of stalk/plant and the length of inflorescens portion. PP-333 at 50 ppm increased number of florets/spike significantly by 27.34, 25.81 compared to 17.67, 20.09 respectively for control in both seasons. PP-333 at 25 ppm and A-Rest at 50, 25 ppm increased the number of florets/spike comparing control. PP-333, A-Rest and pinching significantly increased the fresh weight of flower compared to the control, PP-333 had more effect compared to A-Rest or pinching. A-Rest at 50 ppm gave the heaviest dry matter of florets/plant in the first season. while PP-333 at 50 ppm gave the maximum dry weight of florets/plant as compared to control.

B-3- Root characteristics:--Pinching treatments increased the length of roots as compared control plants. PP-333 at 50 ppm or A-Rest at 25 ppm gave the next value in this concern. PP-333 at "25 or 50 ppm" and A-Rest at 25 ppm reduced fresh and dry weights of roots compared to control in both seasons. The pinching treatment gave the least fresh and dry weights of roots/plant in both seasons.

8-4- Chemical compositions.--PP-333 at 25 ppm was increased chlorophyll a and b content followed by PP-333 at 50 ppm in both seasons. A-Rest at 50 ppm increased the carotenoids content, PP-333 at 25 ppm gave the next value in this concern. All treatments did not influence the total carbohydrate percentage in both seasons. PP-333 at 50 ppm was increased N% while A-Rest at 15 ppm raised the N% in the second season compared to control. All treatments increased the KO% as compared to control, especially with PP-333 at 50 ppm which gave the highest value.

3- Callistephus chinensis, L. C-I- The vegetative growth characteristics-All treatments decreased the plant height compared to the control. The shortest plants length resulted from PP-333 at 25 ppm, the decreasing in the plant height was significant. In the first season A-Rest at 25 or 50 ppm increased the stem diameter. The influence was significant in the first season and not significant in the second one. PP-333 at 50 ppm gave the maximum number of branches/plant as comparing to control plant. PP-333, A-Rest and pinching treatment had reduction the effects on the fresh and dry weights of leaves/plant as compared to control in both seasons. PP-333 or A-Rest significantly increased the leaf area as compared to pinching or control.

C-2- The flowering characteristics:--PP-333 at 50, 15 ppm increased the number of stalks and heads as compared to control. The length of the stalk significantly decreased when the plants were treated with PP-333 or A-Rest and pinching as compared to control. A-Rest at 25 ppm or pinching treatment gave the big diameter of flowerheads, PP-333 at 50 ppm produced the small diameters of flower heads. PP-333 at 50 ppm had increased the fresh and dry weights of flowerheads/plant as compared to control, while PP-333 at 25 ppm or A-Rest at 25 or 50 ppm and pinching treatments significantly decreased the fresh and dry weights.

C-3- Root characteristics:--PP-333 or A-Rest and pinching treatments significantly decreased the length of root in both seasons as compared to control. PP-333 at 50 ppm gave the heaviest fresh and dry weights of roots in both seasons, while A-Rest at 25 ppm gave the second value in this concern. The pinching treatments gave the least fresh and dry weights in both seasons. The differences were statistically significant in both seasons.

C-4- Chemical compositions:--PP-333, A-Rest and pinching treatments increased the chlorophyll a, and carotenoids content as compared to control especially with the low concentrations. PP-333 at 50 ppm increased the total carbohydrate %. A-Rest at 50 ppm reduced total carbohydrate. In both seasons, PP-333 at 50 ppm increased N %, in the leaves comparing with other treatments. All treatments had no effects on P % . K % in the leaves increased by any application of PP-333, A-Rest and pinching treatment. The high percent of K % was noticed with PP-333 at 25 ppm.