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ROLE OF POTASSIUM AND PHOSPHORUS IN ALLEVIATING WATER STRESS IN SOYBEAN PLANTS

BY

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V- SUMMARY

The present study was carried out at EL-Gemmeiza Agricultural Research Station during 2016 and 2017 summer seasons to examine the role of some potassium and phosphorous fertilization treatments in alleviation the bad effect of water deficit on soybean plants at different growth stages. For this purpose a field experiment designed in split plot design were used where water stress treatments were laied out in the main plot and fertilizer treatments were in the sub-plot.

The obtained results could summarized as follows:

1- Effect of water stress:

Data indicated that all physiological measurements significantly affected by all water stresses treatments in vegetative sample (V2-V4), reproductive sample (R1-R3) and reproductive sample (R4-R6).

In the first sample (V2-V4) data clearly showed that exposure soybean plant to water stress in the vegetative growth stage significantly increase cell membrane stability, leaf osmotic potential and proline content and decrease RWC, chlorophyll a, chlorophyll b, chlorophyll a+b, inter nodes length, leaf area index and total dry maters in both seasons compared with the full irrigation.

As for the second sample (R1-R3), the exposure of soybean plants to water stress in the flowering stage led to a significant increase in the stability of the cell membrane, leaf osmotic potential, chlorophyll content, proline content and number of pod/plant. On the other side, the exposure of soybean plants to water stress in the flowering stage led to a significant decrease in RWC, inter nodes length, leaf area index and total dry maters in both seasons.

As for the 3rd sample (R4-R6), the exposure of soybean plants to water stress in the pod filling stage led to significant increase in osmotic potential and

proline content. While, exposure soybean plant to water stress during flowering stage resulted in the large increase of number of pod/plant, 100-seed weight, seed yield/plant and seed yield/fad in both seasons. On the contrast of this, the exposure of soybean plants to water stress in the pod filling stage led to significant decrease RWC, hlorophyll content, inter nodes length and number of seed/pod.

The result showed that the ability of soybean plant to recovered their nature proprieties such as stability of the cell membrane, osmotic potential, RWC, chlorophyll content, proline content, inter nodes length, leaf area index, total dry mater and number of pod/ dry maters unit if it expose to water stress during vegetative growth and flowering stages. But if it exposure to water stress during pod filling stage it cannot recovered to their nature because it had not enough time to recovered.

2- Fertilizer effects:

Data indicated that the superiority of all fertilization treatments at the control in enhance all physiological and yield parameters of soybean cultivar Giza 111 in the two seasons of the study.

The result sowed that soybean plants treated with 24 kg K_2O + 45 kg P_2O_5 recorded the lowest stability values of the cell membrane, the lowest RWC and the highest chlorophyll a content among all tested fertilizers in the three samples during both seasons.

Data indicated that soybean plant that treated with 24 kg K_2O + 30 kg P_2O_5 /fad recorded the lowest osmotic potential, the lowest proline content, the lowest chlorophyll b, the lowest chlorophyll a+b, the longest inter nodes length, the highest leaf area index, the highest total dry maters, the highest total number of pod/ dry maters unit, the highest number of pod/ plant, the highest number of

seed/pod, the heaviest 100-ssed, the highest seed yield/plant and the highest seed yield/fad in two seasons of the study

a. Interaction effects:

The result confirmed that soybean cv. Giza 111 expressed a differ response to water stress periods under all fertilization treatments.

The result indicated that 24 kg K_2O /fad and 24 kg K_2O + 30 kg P_2O_5 /fad seemed to be excellent **migrators** to water stress in soybean where it resulted in significant favorable enhance in all physiological, yield and yield components traits under water stress during vegetative, flowering and pod filling stages.