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CHAPTER FIVE
SUMMARY AND CONCLUSIONS

This work was conducted at the experimental station of Al-Bostan, at Al-Bostan region, Egypt.

The objectives of this study were to evaluate the effect of different parameters of sprinkler irrigation systems on distribution uniformity, assumed minimum rate of water and irrigation duration using the following :

1- Three nozzle diameter of (6, 7 and 8 mm)
2- Three sprinkler base pressure of (300, 350 and 400 kPa)
3- Two riser height of (80 and 250 cm)
4- Three spacing pattern sprinklers.
   a - Square spacing (15 m between laterals × 15 m between sprinklers)
   b - Rectangular spacing (18 m between laterals × 15 m between sprinklers)
   c - Triangular spacing (15 m between laterals × 18 m between sprinklers)

The results of this study may be summarized as follows::

A- For distribution uniformity :

For each pattern (square, rectangular and triangle) the statistical analysis for each parameter show that there was significant difference as well as interaction among those parameters (nozzle diameter, sprinkler base pressure and riser height).

1- Square spacing pattern sprinkler

The highest distribution uniformity was remarked as 79.22 % for the interaction of 7 mm nozzle diameter and 400 kPa sprinkler base pressure with the short riser (80 cm). The lowest uniformity distribution was remarked as 65.51 % for the interaction of 8 mm nozzle diameter and 300 kPa with the short riser (80 cm).

2- Rectangular spacing pattern sprinkler

The highest distribution uniformity was remarked as 83.72 and 83.52 % for the interaction of 8 mm nozzle diameter and 400 kPa sprinkler base pressure with the riser heights 80 and 250 cm respectively. The lowest uniformity distribution was remarked as 70.15 % for the interaction of 8 mm nozzle diameter and 300 kPa with the short riser (80 cm).

3- Triangle spacing pattern sprinkler

. The highest distribution uniformity was remarked as 80.50 % for the interaction of 7 mm nozzle diameter and 400 kPa sprinkler base pressure with the short riser (80 cm). The lowest uniformity distribution was remarked as 61.89 % for the interaction of 8 mm nozzle diameter and 300 kPa with 250 cm riser height.

B- For assumed minimum rate of water (Rn):

1- For square spacing pattern sprinkler

The highest (Rn) was 13.723 mm/h for the interaction of 8 mm and 400 kPa with the long riser, 250 cm. That's mean that it will be the shortest irrigation duration.

2- For rectangular spacing pattern sprinkler

The highest (Rn) was 13.679 mm/h for the interaction of 8 mm and 400 kPa with the short riser, 80 cm. That's mean that it will be the shortesr irrigation duration

3- For triangle spacing pattern sprinkler

The highest (Rn) was 11.298 mm/h for the interaction of 8 mm and 400 kPa with the short riser, 80 cm That's mean that it will be the shortest irrigation duration.

C- For irrigation duration (R_i):

1- For square spacing pattern sprinkler

The minimum (R_i) was 2.92 h for the interaction of 8 mm and 400 kPa with the 250 cm riser height. While the maximum (R_i) was 6.69 h for the interaction of 6 mm and 300 kPa with the 250 cm riser height.

2- For rectangular spacing pattern sprinkler

The minimum (R_i) was 2.92 h for the interaction of 8 mm and 400 kPa with the 80 cm riser height. While the maximum (R_i) was 6.68 h for the interaction of 6 mm and 300 kPa with the 250 cm riser height.

3- For triangle spacing pattern sprinkler

The minimum (R_i) was 3.54 h for the interaction of 8 mm and 400 kPa with the 80 cm riser height. While the maximum (R_i) was 7.39 h for the interaction of 6 mm and 300 kPa with the 250 cm riser height.

Results show that the highest distribution uniformity for 80 cm riser height was 83.72 % for the combination of 8 mm nozzle diameter, 400 kPa and the rectangular spacing sprinkler pattern. For the 250 cm riser height the highest distribution uniformity was 83.52 % for the combination of 8 mm nozzle diameter, 400 kPa and the rectangular spacing sprinkler pattern. The highest assumed minimum rate of water was 13.72 mm/h for the combination of 8 mm nozzle diameter, 400 kPa and 250 cm riser height with the square spacing sprinkler pattern.

In addition, from this study assembly design to any grower can be achieved by choosing any of the three sprinkler patterns and the corresponding nozzle diameter and sprinkler-base pressure to get the highest distribution uniformity according to the possibility of the farm equipments.