SUMMARY

5 - SUMMARY

The present investigation was undertaken throughout the two successive seasons of 2008 and 2009 at the greenhouse of the Experimental Farm of Faculty of Agriculture, Moshtohor, Benha university, Egypt. Consequently, this investigation included three main parts as follows :

Part I: Effect of seed soaking of two papaya cvs. (Solo and Betty) in some chemical substances at different concentrations on germination parameters, some growth measurements and nutritional status of the emerged papaya seedlings.

Part II: Effect of seed treating of two papaya cvs. (Solo and Betty) with various doses of gamma irradiation on seed germination parameters, some growth measurements and nutritional status of the emerged papaya seedlings.

Part III: Cytological study of the papaya seedlings which resulted from germinated seeds and treated with both colchicine and EMS solutions to throw some light on their chromosomal behaviour .

In this regard , mature papaya seeds cvs. " Solo " and " Betty " were extracted from ripe fruits of trees grown at the Experimental Farm of (El – Kanater Horticultural Research Station), Kalybeia Governorate, Egypt The seeds were collected and planted in March of 2008 and 2009 seasons These seeds were subjected to one of the following treatments :

1 -Seeds were soaked in tap water for 24 hours (control) .

2 -Seeds were soaked in gibberellic acid (GA_3) at 20, 100 or 150ppm

3 -Seeds were soaked in naphthalene acetic acid (NAA) at 25, 50 or 75 ppm.

4 -Seeds were soaked in yeast extract at 50 , 100 or 150 ml/L.

5 -Seeds were soaked in colchicine at 20 , 30 or 40 mg / L .or , 0.4 %) .

With respect to study the effect of gamma irradiation at the different doses on some germination and growth parameters of papaya , the previously collected seeds were subjected to one of the following treatments :

1 -Control treatment (untreated seeds).

2 - Seeds soaked in water and irradiated with gamma rays at 10Kr.

3 - Seeds soaked in water and irradiated with gamma rays at 20Kr.

4 - Seeds soaked in water and irradiated with gamma rays at 40Kr.

Moreover , in both 2008 and 2009 seasons of study , seeds soaked in different solutions of chemical substances and those irradiated with gamma rays as well as untreated seeds which represent the control treatment were sown in March , 25th in plastic pots (30 cm . indiameter) filled with a mixture of sand and clay soil (1 : 1 by volume), then these plastic pots were kept under greenhouse conditions .

The randomized complete block design was used for arranging the abovementioned treatments with three replications,

whereas each replicate was represented by one plastic pot sown with (50) seeds . The effect of tested chemical substances on seed germination was evaluated through the following germination parameters: germination percentage and germination rate. The obtained results could be summarized as follows:

A.I.1. Effect of seed soaking of two papaya cvs. (Solo and Betty) in some chemical substances at different concentrations on seed germination parameters.

A.I.1.1. Germination percentage:

All tested treatments except colchicine and EMS enhanced germination percentage as compared with the control . Briefly the most effective treatments in this respect were 100 ppm GA_3 , 50 ml/L yeast extract and 25 ppm NAA treatments

A.I.1.2.Germination rate:

All tested treatments except colchicine and EMS enhanced germination rate as compared with the control . Briefly the most effective treatments in this respect were 100 ppm GA_3 , 50 ml/L yeast extract and 25 ppm NAA treatments

A.I.2. Effect of seed soaking of two papaya cvs. (Solo and Betty) in some chemical substances at different concentrations on some growth measurements of emerged papaya seedlings:

With respect to study the effect of the previously abovementioned on some growth measurements of the emerged papaya seedlings per each treatment (three seedlings from each replicate) of the previously aforesaid treatments nearly uniform

as possible as we could in their growth vigour, were left in the plastic pots and the remain seedlings were removed . The seedlings received regularly the usual cultural practices . The treatments were arranged in a randomized completely block design with three replicates for each treatment however , each replicate was represented by three papaya seedlings . On the third week of November during both seasons of study as an experiment was ended ,the effect of the different investigated treatments on some vegetative growth measurements were evaluated by the following growth parameters :

1 -Seeding height (cm) .

2 -Root length (cm) .

3 -Number of leaves per seedling .

4 -Fresh weight (gm.) of vegetative growth.

5 -Fresh weight (gm.) of root system .

6 -Dry weight (gm.) of vegetative growth.

7 -Dry weight (gm.) of root system .

8 -Top / root ratio of dry weight .

A.I.2.1. Seedling height (cm):

Generally, papaya seedlings arised from 100 ppm GA_3 soaked seeds had the tallest seedlings . Also, 50 ml/L yeast extract and 25 ppm NAA soaked seeds gave comparatively taller seedlings. On the contrary, untreated seeds " control ", Colchicine and EMS – Soaked seeds produced the shortest seedlings.

A.I.2.2. Root length (cm):

Generally, 100 ppm " GA_3 ", 50 ml / L " yeast extract " and 25 ppm " NAA" soaked seeds produced seedlings with the highest length of root . On the other hand , Colchicine , EMS and untreated seeds (control) soaked seeds produced the lowest length of root.

A.I.2.3. Number of leaves per seedling:

Briefly , seedlings arised from 100 ppm " GA_3 " , 50 ml/L " yeast extract " and 25 ppm " NAA " soaked seeds gave the highest number of leaves as compared with those arised from " EMS" , Colchicine and untreated seeds " control " .

A.I.2.4. Fresh weight (gm) of vegetative growth (top weight):

Generally, seedlings arised from 100 ppm " GA_3 ", 50 ml/L " yeast extract " and 25 ppm (NAA) soaked seeds , gave the highest fresh weight of vegetative growth as compared with untreated seeds (control) Colchicine and EMS .

A.I.2.5. Fresh weight of root system:

The highest fresh weight of root system arised from 100 ppm " GA_3" , 50 ml / L yeast extract and 25 ppm NAA Soaked seeds . On the other hand , the lowest fresh weight of root system arised from untreated seeds (control), (EMS) and " Colchicine " soaked seeds.

A.I.2.6. Dry weight of vegetative growth :

Generally, seedlings arised from 100 ppm " GA_3 ", 50 ml/L " yeast extract " and 25 ppm " NAA" soaked seeds gave the

highest dry weight of vegetative growth as compared with " EMS " , Colchicine and untreated seeds (control) .

A.I.2.7. Dry weight of root ststem :

The highest dry weight of root system arised from 50 ppm " GA_3" , 50 ml/L yeast extract and 25 ppm NAA soaked seeds . On the contrary , the lowest dry weight of root system arised from " EMS " , " Colchicine " and untreated seeds (control) soaked seeds .

A.I.2.8. Top / root ratio of dry weight:

Generally , seedlings arised from 50 ppm GA_3, soaked seeds gave the highest top / root 50 ml/L " yeast extract " and 25 ppm " NAA" –ratio of dry weights .

A.I.3. Effect of seed soaking of two papaya cv. (Solo and Betty) in some chemical substances at different concentration on seedling mineral content.

A.I.3.1. Effect on leaf and root nitrogen content :

Generally , 100 ppm " GA_3 ", 50 ml/L " yeast extract " and 25 ppm " NAA " soaked seeds gave the highest value of leaf and root nitrogen content as compared with untreated seeds "control".

A.I.3.2. Effect on leaf and root phosphorus content :

Generally , 100 ppm " GA3 ", 50 ml/L " yeast extract " and 25 ppm " NAA " soaked seeds gave the highest value of leaf and root phosphorus content as compared with untreated seeds " control " .

A.I.3.3. Effect on leaf and root potassium content :

Generally , 100 ppm " GA3 " , 50 ml/L " yeast extract " and 25 ppm " NAA " soaked seeds gave the highest value of leaf and root potassium content as compared with untreated seeds " control " .

A.I.3.4. Effect on leaf and root iron content :

Generally , 100 ppm " GA3 " , 50 ml/L " yeast extract " and 25 ppm " NAA " soaked seeds gave the highest value of leaf and root iron content as compared with untreated seeds "control".

A.I.3.5. Effect on leaf and root zinc content :

Generally , 100 ppm " GA3 " , 50 ml/L " yeast extract " and 25 ppm " NAA " soaked seeds gave the highest value of leaf and root zinc content as compared with untreated seeds " control" .

A.I.3.6. Effect on leaf and root manganese content :

Generally , 100 ppm " GA3 " , 50 ml/L " yeast extract " and 25 ppm " NAA " soaked seeds gave the highest value of leaf and root manganese content as compared with untreated seeds " control " .

II.1. Effect of seed treating of two papaya cv. (Solo and Betty) with gamma irradiation at various doses on seed germination parameters.

II.1.1. Germination percentage and rate :

Generally, water – soaked seeds , and treated with gamma rays at (40) Kr gave higher germination percentage and rate as compared with the control and other doses of gamma rays .

II.2. Effect of seeds treating of two papaya Cv. (Solo and Betty) with gamma irradiation at various doses on some growth measurements.

II.2.1. Seedling height (cm):

The tallest seedlings were arised from water – soaked seeds (control) . On the other hand , water – soaked seeds and treated with gamma rays at different doses produced shorter seedlings .

II.2.2. Root length (cm):

Generally, seedlings arised from water – soaked seeds (control) gave the highest length of root as compared with water – soaked seeds and treated with gamma rays at different doses .

II.2.3. Number of leaves per seedling:

Brief, seedlings arised from water – soaked seeds (control) gave the highest number of leaves as compared with water – soaked seeds and treated with gamma rays at different doses .

II.2.4. Fresh weight of vegetative growth:

Generally, water – soaked seeds increased the fresh weight of vegetative growth . On the other hand , water – soaked seeds and treated with gamma rays at fifferent doses decreased the fresh weight of vegetative growth .

II.2.5. Fresh weight of root system :

Generally, water – soaked seeds increased the fresh weight of root system as compared with water soaked seeds and treated with gamma rays at different doses .

II.2.6. Dry weight of vegetative growth :

Generally , water – soaked seeds increased the dry weight of vegetative growth . On the other hand , water – soaked seeds and treated with gamma rays at different doses decreased the dry weight of vegetative growth .

II.2.7. Dry weight of root system :

Generally , water – soaked seeds increased the dry weight of root system as compared with water – soaked seeds and treated with gamma rays at different doses .

II.2.8. Top / root ratio of dry weight :

Generally, water soaked seeds and treated with gamma rays at 10 kr increased the top / root ratio as compared with untreated seeds" control.

II.3. Effect of seed treating of two papaya Cv. (Solo and Betty) with gamma irradiation at various doses on seedling mineral content.

II.3.1. Effect on leaf and root nitrogen content:

Generally, water – soaked seeds and treated with gamma rays at 40 k-rad . gave the highest value of leaf and root nitrogen content as compared with untreated seeds " control ".

II.3.2.Effect on leaf and root phosphorus content:

Generally, water – soaked seeds and treated with gamma rays at 40 k. rad gave the highest value of leaf and root phosphorus content as compared with untreated seeds " control ".

II.3.3.Effect on leaf and root potassium content:

Generally , water – soaked and treated with gamma rays at 40 k.rad gave the highest value of leaf and root potassium content as compared with untreated seeds " control " .

II.3.4. Effect on leaf and root iron content:

Generally , water – soaked seeds and treated with gamma rays at 40 k-rad . gave the highest value of leaf and root iron content as compared with untreated seeds " control " .

II.3.5.Effect on leaf and root zinc content:

Generally , water – soaked seeds and treated with gamma rays at 40 k. rad gave the highest value of leaf and root zinc content as compared with untreated seeds " control " .

II.3.6. Effect on leaf and root manganese content:

Generally , water – soaked and treated with gamma rays at 40 k.rad gave the highest value of leaf and root manganese content as compared with untreated seeds " control " .

III. Cytological studies:

In all materials under this investigation, the somatic chromomosome number was found to be 18 chromosomes indicating that Solo and Betty cultivars (2n = 18) .

It was found that, mutagens induced lagging chromosomes that may caused different plants.

Conclusion

Under study condition ,it could be recommended for soaking papaya seeds cvs. Solo and Betty in GA3 solution at 100ppm, yeast extract at 50m/L and NAA at 25ppm for 24 hours or treating seeds with gamma irradiation at 40 K. rad in order to improve germination percentage& rate and improve seedlings growth.