SUMMARY

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Analytical studies of growth and technological properties of some promising strains of flax

A two-year field experiment was carried out at Gemmiza Res. Station, Gharbia Governorate, in the two successive seasons 93/94 and 94/95 to evaluate growth, yield and yield components using several combinations of P and N. Split-split plot design in four replicates was used in each season. The main plot, included phosphorous fertilizer rates (zero, 15 and 30 kg P_2O_5/fed), the nitrogen fertilizer rates at the doses of 30, 45 and 60 Kg N/fed were assigned to sub plots. The four flax genotypes were S-282/37, S-329/2, S-2651/2 and Giza 7 cv. These were icluding in sub-sub plots. The sub-sub plot area was 2x3 m = 6 m^2 (1/700 feddan). The sowing dates were 12 and 15 November in both seasons, respectively. Normal cultural practices of growing flax were used. Results obtained could be summarized as follow:

I. Growth characters:

1. There was significant differences in the two growth traits plant height and stem dry weight among the four sampling dates at 60, 80, 100 and 120 days from sowing as affected by phosphorus fertilizer levels 0, 15 and 30 Kg P_2O_5/fed in both seasons. Gradual increments in the mean values with each increase of phosphorus occurred with sampling date in the two successive seasons.

2. The two growth characters i.e. plant height and stem dry weight were significantly affected by applying nitrogen fertilizer levels 30, 45 and 60 kg N/fed in each of the four sampling dates in both

seasons. The mean values increased with increasing nitrogen level from 30 to 45 or 60 kg/fed. Moreover, the greatest increase in mean values were recorded when N rate was raised from 30 to 45 or 60 kg N/fed as to both traits in both seasons.

3. The four flax genotypes were significantly different in plant height at each of the four sampling dates at 60, 80, 100 and 120 days old in both seasons. S-329/2 ranked first with mean values of 22.14, 36.38, 71.40 and 82.45 cm, followed by S-282/37 with means values of 21.61,35.19, 70.26 and 80.99 cm, Giza 7 cv. ranked third with mean estimates of 20.84, 34.71, 69.26 and 79.70 cm and the shortest plants were obtained by S-2651/2 with mean values of 19.90, 34.16, 67.42 and 76.75 cm in the first season for the four sampling dates, respectively. The mean values in the second one showed similar genotypes arrangement as follows; S-329/2 (20.28, 32.07,64.66 and 75.18), S-282/37 (20.12, 31.79, 62.12 and 73.87 cm), Giza 7 cv. (18.79, 30.97, 61.65 and 73.29 cm) and the shortest flax plants were obtained by S-2651/2 with mean values of 18.43, 30.72, 60.67 and 66.57 cm.

4. Flax strain 329/2 also ranked first in stem dry weight, followed by S-282/37 > S-2651/2 > Giza 7 cv. at all the four sampling dates in both seasons.

5. CGR values increased gradually from the first period up to the last one in the first season. But in the second season, a decreased

happened between the two and slight increase occurred in the third period.

6. RGR values increases in the second season, but in the first season it was in the opposite direction.

7. Concerning P level effect on CGR and RGR, results illustrated no definite trend.

8. Regarding CGR flax plants mean values at the first growth period were higher than the other two ones by increasing nitrogen rates from 30 to 60 kg N/fed, while RGR values were increased with increasing nitrogen rates to 45 kg/fed.

9. The two flax genotypes S-329/2 and S-282/37 ranked first or second regarding CGR in the first and second season, S-2651/2 and S-282/37 ranked first and second in the first season, while S-329/2 and S-2651/2 assumed the first and second position in relation to RGR estimates in the second season.

II. Maturity stage

a. Straw yield and its related characters:

1. Application of phosphorus fertilizer levels of 0, 15 and 30 kg P_2O_5/fed caused significant effects on total plant height, technical stem length, main stem diameter, straw yield/plant as well as per feddan and fiber yield/plant as well as per feddan in both seasons. On the other hand, in the second one the differences in mean values of fiber yield/plant in the first season, in addition to total plant height, technical stem length and straw yield/fed did not reach the

level of significance by raising phosphorous level from 15 to 30 k/fed.

2. There were gradual increments in each of the straw yield characters previously mentioned with increasing P level from zero up to 15 or 30 kg/fed in both seasons. Moreover, the highest mean values of these traits were obtained when flax was fertilized with 30 kg P_2O_5/fed in the two successive seasons.

3. Increasing nitrogen level from 30 to either 45 or 60 kg/fed caused remarkable increments in all straw yield and related characters and the highest mean values were obtained by applying 60 kg N/fed, especially for plant height, technical stem length, straw yield/plant, straw yield/fed and fiber yield/plant as well as per feddan.

4. Flax strain 329/2 surpassed the other three flax genotypes concerning the all straw yield and its components in both seasons.

5. The highest estimates of straw yield were obtained by adding 30 kg P_2O_5/fed combined with 60 kg N/fed, but the lowest mean values were obtained by zero phosphorus combined with 30 kg N/fed in all straw yield and related character in both seasons.

b. Seed yield and its related characters:

1. All seed yield and its components increased significantly by phosphorus levels of 15 or 30 kg/fed, meanwhile, apical branching zone length, number of capsules/plant, number of seeds/capsule and 1000-seed weight characters did not reach the level of significance when P level increased from 15 to 30 kg/fed in both seasons.

2. Gradual increases had shown in all seed yield characters studied with increasing P level from 0 to 15 or 30 kg P_2O_5/fed in both seasons.

3. Application of nitrogen fertilizer levels to flax caused remarkable increases in all seed yield characters in both seasons. The mean values of these traits showed progressive increments with increasing N level from 30 to 45 or 60 kg/fed in the two successive seasons.

4. Important seed characters were at highest magnitude in the strain 2651/2 which ranked first, but Giza 7 cv. ranked last when compared with the other flax genotypes in both seasons.

c. Technological characters:

1. The four technological characters fiber percentage, fiber length, fiber fineness and oil percentage were significantly affected by phosphorus fertilizer levels in both seasons. Increments occurred in each of the above mentioned characters with increasing P level up to 30 kg/fed in the two successive seasons.

2. Application of nitrogen level at 30, 45 and 60 kg/fed to flax increased significantly the mean values of the three technological characters; fiber length, fiber percentage and oil percentage, while fiber fineness decreased with increasing nitrogen level up to 60 kg/fed in both seasons.

3. Flax strain 282/37 ranked first in only fiber length character followed by S-329/2 with no significant difference between each

other. Moreover, the flax strain (S-329/2) gave the highest fiber percentage and fiber fineness and ranked third in oil percentage. Meanwhile, S-2651/2 gave the highest oil percentage and surpassed the other three flax genotypes in the two successive seasons.

d. Chemical characters of flax fibers:

1. Application of phosphorus fertilizer levels 0, 15 and 30 kg P_2O_5/fed caused significant differences in cellulose, pectin and lignin percentages in both seasons. Slight increments appeared in the mean values of each trait with increasing P level from zero to the treatments 15 or 30 kg P_2O_5/fed in both seasons.
2. There were significant differences in cellulose, pectin and lignin percentages as affected by increasing nitrogen fertilizer levels from 30 to 60 kg/fed. Results revealed progressive increases in pectin and lignin percentages in both seasons. Cellulose percentage showed some reduction with increasing N level from 45 to 60 kg N/fed in both seasons.
3. Flax strain 329/2 gave the highest cellulose percentage and ranked first over the other three flax genotypes, and was lowest in pectin and lignin percentages in both seasons. On the other hand, S-2651/2 was the lowest in cellulose percentage and the highest in pectin and lignin percentages and accordingly produced coarser fiber.

From the above mentioned results, it could be mentioned that the economic fertilizer rates of phosphorus and nitrogen for obtaining economical flax yield of straw, fiber and seeds of good quality were 15 kg

P_2O_5/fed and 60 kg N/fed. Flax strain 329/2 gave the highest straw yield and yield components in addition to good fiber quality. Meanwhile, S-2651/2 ranked first concerning seed yield and seed oil percentage followed by S-282/37 in this case in the two successive seasons.

Thus, it could be recommended that to S-329/2 be grown for soke of its highest yields of straw and fiber and for better fiber quality, while S-2561/2 is more suitable for its high seed and oil yielding ability.

Correlation coefficient studies:

- Total plant height showed significant positive correlation with fiber yield/plant and per feddan, seed yield/plant and feddan, and straw yield/plant and per feddan during the sample taken at 60, 100 and 120 days from sowing.
- The relationships between the main stem diameter and each of the six flax characters, namely, fiber yield/plant, fiber yield/fed, seed yield/plant, seed yield/fed, straw yield/plant and straw yield/fed were significant and positive.
- There are significant positive correlation coefficients between RGR and straw and fiber yield/plant for the period from 60 to 80 days old. Similarly, significant r values appeared with fiber yield/plant, fiber yield/fed and straw yield/plant for the periods from either 80 to 100 or 100 to 120 days old.
- Results obtained showed significant positive relationships between CGR and each of fiber yield/fed, seed yield/plant, seed yield/fed

and straw yield/plant or per feddan for the period from 60 to 80 days old. For the period of 80-100 days old, significant and positive correlation coefficients were detected with all the above mentioned characters. Meanwhile, CGR showed the same significant correlation with fiber yield/plant, fiber yield/fed and straw yield/fed for the period of 100-120 days old.

- There are significant and positive r values between each of stem dry weight and fiber yield/fed, seed yield/plant, seed yield/fed and straw yield/fed at 60 and 80 days old, while at 100 days old, stem dry weight showed significant and positive correlations with fiber yield/plant, fiber yield/fed, seed yield/plant, seed yield/fed, straw yield/plant and straw yield/fed.
- The relationships between total plant height and the six characters under study were significant and positive.
- Correlation coefficients appeared significant between RGR and fiber yield/fed for the period of 60-80 days, and insignificantly negative with straw yield/fed for the same period as well as at the period of 80-100 days and insignificant and positive at the period of 100-120 days.
- The association between CGR and fiber yield/plant at the period of 60-80 days old were insignificant and positive, in addition to seed yield/plant for the period from 100-120 days old and insignificant and negative with seed yield/fed in the same previous period.

- There are insignificant positive correlation between stem dry weight and all characters studied at 120 days old; insignificant and negative with either fiber yield/plant or straw yield/plant at the two ages 60 and 80 days from sowing.
- There are significant negative r values between RGR and seed yield/plant and per feddan at the three periods of 60-80, 80-100 and 100-120 days old.