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# STUDIES ON THE INFLUENCE OF CROP ROTATION AND PRECEDING WINTER CROPS ON PEANUT YIELD IN SANDY LANDS.

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ABSTRACT: Crop rotations have been started since 1997 / 1998 in the experimental farm of Ismaielia Agricultural Research Station A.R.C Egypt to study the effect of different crop rotations i.e., monoculture, 2 – year and 3 – year rotations as well as preceding winter crops (wheat, c.v. Sakha 69 , Berseem c.v. Meskawy and faba bean c.v Giza 461) on peanut plants c.v Giza 4 . Split plot design with four replications was used where crop rotation patterns were allocated in the main plots, while the preceding winter crops were distributed at random in sub plots . Sprinkler irrigation system was used for all crops.

The combined data from the last two growing seasons 2000 / 2001 and 2001 / 2002 revealed that, crop rotation had significant effect on plant height, number of branches / plant, number of pods / plant, number of seeds / 100 – pod , weight of pods / plant , 100 – seed weight , seed yield plant , seed yield / fad and protein % , while the effect on oil % was insignificant . The highest values of all these traits were recorded by application of 3 – year rotation except oil %, which was recorded by monoculture of peanut. Monoculture of peanut plants resulted in the lowest values of all mentioned characters except oil %.

Preceding winter crops exhibited a significant effect on plant height, number of branches / plant, number of pods / plants, number of seeds / 100 – pod, weight of pods / plant, 100 – seed weight, seed yield / plant, seed yield / fad and protein % . Planting peanut after berseem produced the highest values of all traits except plant height, which was higher after faba bean. Insignificant increase was detected in oil % by growing peanut after wheat.

**Significant interaction effect between crop rotation and preceding crops was recorded, where growing peanut in 3 – year rotation after berseem resulted in the highest values of number of pods / plant, weight of 100 – seeds and seed yield / fad .**

**Seed yield / fad was highly correlated with each of yield attributes except plant height. Also, strong associations between protein % and each of yield attributes were found. While negative correlation coefficients were recorded between oil % and each of all studied traits of peanut.**

**Key words: Crop rotation; monoculture; preceding crops; legumes; cereals; peanut; correlation coefficient.**

## INTRODUCTION

Many investigators studied the role of crop rotation and preceding crops in affecting soil productivity as well as increasing crop production. Badr (1971) stated that in monoculture, the soil suffer from growing certain crop every year and this might be account much for the spread of disease, weeds and some other unfavorable factors for growth, while, 3 – year rotation was more favorable than others and similarly, 2 – year rotation was better than monoculture. Peanut plants grown after faba bean produced the greatest yield of peanuts comparing to peanuts grown after berseem , barley and wheat. El – Debaby et al ( 1984 ) indicated that soil nitrogen percentage increased after legumes than non – legume crops . Crookston and Kurle ( 1989 ) reported that alternating one crop with another may result in beneficial differences in soil moisture , physical properties of soil , weeds , insects , diseases and nutrition elements . They added that the residues of alternate crops had a stimulatory effect on one another under rotation system. Peterson and Varvel (1989) found that cereal crops produced greater yield when legumes preceded it than that preceded by another cereal crop or monoculture. Varvel and Peterson (1990) concluded that crop rotation reduced inorganic nitrogen fertilizer needs and at the same time reduced the amount of nitrogen available for leaching and these led to increase crop yields.Trepache et al (1991) mentioned that legume crops might improve the soil fertility and increase yields after legumes than

hat after non – legumes. this may be due to the mobilization of soil humus and nitrogen and influences of biological oxidation of active organic matter of legumes left in the soil ( fine root hairs , root exudates and nodules ) which normally is not taken into consideration . Aly et al ( 1993) found that the residual effect of 2 – year and 3 – year rotations, as well as , the preceding winter crops significantly affected yield and its components of maize , the maximum yield was obtained by growing maize after faba bean in 3 year rotation . Copeland et al (1993) revealed that the yield reduction under continuous mono-culture may be attributed to increase pathogenic micro- organisms or decrease the population of antagonistic micro - organisms and other-wise beneficial in the rhizosphere production of phytotoxic allelopathic chemicals or changes in physical condition of the soil . Ghosh and Singh ( 1995 ) found that nitrogen status was higher after legumes such as cowpea and lower after non – legumes such as maize. Sherif et al (1995) mentioned that preceding winter crops had significant effect on yield and its attributes of maize , growing maize after faba bean or berseem was superior than after wheat or barley . Singh et al (1996) investigated four crop sequences, i.e., maize / wheat, rice /wheat, soybean / wheat and groundnuts / wheat and they found that production of legumes was more stable in different years than that of cereals, wheat grew after groundnuts or soybean recorded higher and stable yields than that after maize or rice. Gabr (1998) stated that the effect of preceding winter crops (berseem or barley) had significant effect on peanut. Where plants preceded by berseem produced higher values of plant height, number of branches / plant, number of pods / plant, weight of pods / plant, weight of 100 pods, weight of seeds / 100 – pods, 100 – seeds weight, pod yield / fad and seed oil % compared with that preceded by barley. Greish (1998) found that preceding winter crops ( faba bean and barley ) had insignificant effect on growth , yield and its components of peanut All peanut characteristics were slightly higher when preceded by faba bean than wheat. Jicheng et al (1998) concluded that crop rotation led to an important improvement in soil fertility when they investigated 8 rotations. The highest yields were detected by

**Table (1) : Mechanical and chemical analysis of the soil after winter crops in 2000/2001 and 2001/2002 seasons .**

| Crop Rotation | | Before conducting the experiment | Average of the two seasons | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Monoculture | | 2 - year rotation | | 3 – year rotation | |
| Preceding crops | | | After legumes | After Wheat | After legumes | After wheat | After legumes | After wheat |
| Mechanical analysis | Sand % | 92.87 | 92.66 | 92.80 | 92.53 | 92.64 | 90.94 | 91.72 |
| | Silt % | 3.10 | 3.30 | 3.19 | 3.32 | 3.25 | 3.91 | 3.36 |
| | Clay % | 4.03 | 4.04 | 4.01 | 4.15 | 4.11 | 5.15 | 4.92 |
| | Bulk density | 1.72 | 1.70 | 1.73 | 1.67 | 1.68 | 1.52 | 1.59 |
| | Texture | Sandy | Sandy | Sandy | Sandy | Sandy | Sandy | Sandy |
| Chemical analysis | pH | 7.7 | 7.5 | 7.6 | 7.5 | 7.6 | 7.4 | 7.5 |
| | O.M.% | 0.47 | 0.61 | 0.52 | 1.30 | 0.8 | 1.67 | 0.97 |
| | N p p m | 17.25 | 20.15 | 18.01 | 28.07 | 19.21 | 29.16 | 19.23 |
| | Pp p m | 2.22 | 3.23 | 2.21 | 3.24 | 2.21 | 4.26 | 2.23 |
| | Kp p m | 71.98 | 75.82 | 73.09 | 88.01 | 73.12 | 95.13 | 79.00 |

- Sowing and harvesting dates and crop varieties are presented in Table ( 2 ).

**Table ( 2 ) Sowing and harvesting dates of the winter and summer crops for all cropping patterns in 1999 / 2000 , 2000 / 2001 and 2001 / 2002 seasons**

| Seasons | 1999 / 2000 | | 2000 / 2001 | | 2001 / 2002 | |
|---|---|---|---|---|---|---|
| Crop – variety | Sowing | Harvest | Sowing | Harvest | Sowing | Harvest |
| Berseem ( Meskawy ) | 12 October | 16 May | 15 October | 17 May | 14 October | 15 May |
| Faba bean (Giza 461) | 12 October | 2 May | 15 October | 3 May | 14 October | 2 May |
| Wheat ( Sakha 69 ) | 15November | 10 May | 17 November | 9 May | 16 Nov. | 10 May |
| Peanut ( Giza 4 ) | 25 May | 28 Sept. | 23 May | 30 Sept. | 24 May | 29 Sept. |
| Sesame ( Giza 32 ) | 25 May | 20 Sept. | 23 May | 22 Sept. | 24 May | 21 Sept. |

rotation wheat /groundnuts / maize . while the lowest yields were detected by the rotation water melons / groundnuts .Gabr et al ( 1999 ) revealed that planting peanuts after legumes (berseem and faba bean) significantly increased number of seeds / 100 pods , weight of 100 pods , weight of pods / plant , weight of seeds/plant, seed and oil yield / fad .There were insignificant differences between berseem and faba bean as preceding winter crops on peanuts as well as between wheat and barley. They added that 2 – year rotation produced higher yield than monoculture and had the highest values of growth characters and yield components. The superiority of 2 – year crop rotation may be due to improve physical and chemical properties of the soil. They also found strong association between seed yield / plant and per faddan and each of growth and yield attributes, also, insignificant and positive correlation between protein % and each of most studied traits.

The present investigation was carried out to study the effect of crop rotations and preceding winter crops on yield and yield attributes of peanuts.

## MATERIALS AND METHODS

The experiments of the rotations have bean started from 1997 / 1998 till 2001 / 2002 seasons at the farm of Ismaielia. Agricultural Research Station, A.R.C. Egypt to study the effect of crop rotation and preceding winter crops on peanuts yield as follow: -

**I – Monoculture : -**

1– First year winter 1997/1998 [wheat , berseem or faba bean followed by peanuts in summer 1998].

2– Second year 1998/1999 [ The same crop arrangement ]

3– Third year 1999/2000 [ The same crop arrangement ]

4– Fourth year 2000/2001 [ The same crop arrangement ]

5– Fifth year 2001 / 2002 [The same crop arrangement]

**II – 2 – Year rotation: -**

1–First year winter 1997/1998 [wheat, berseem or faba bean followed by peanuts in summer 1998 – winter 1997/1998 wheat, berseem or faba bean followed by sesame in summer 1998]

2 – Second year winter 1998/1999 [wheat, berseem or faba bean followed by sesame in summer 1999 – winter 1998 / 1999 wheat berseem or faba bean followed by peanuts in summer 1999].

3 – Third year 1999/2000 [the same crops in the first year] .
4 – Fourth year 2000/2001 [the same crops in the second year].
5 – Fifth year 2001 / 2002 [ the same crops in the first year ].

**III – 3 – year rotation.**

1 – First year winter 1997/1998 [wheat, berseem or faba bean followed by peanut in summer 1998 – winter 1997/1998 wheat, berseem or faba bean followed by sesame in summer 1998 – winter 1997 / 1998 wheat, berseem or faba bean followed by sesame in summer 1998] .
2 – Second year winter 1998/1999 [wheat, berseem or faba bean followed by sesame in summer 1999 – winter 1998/1999 wheat, berseem or faba bean followed by peanut in summer 1999 – winter 1998 / 1999 wheat, berseen or faba bean followed by sesame in summer 1999].
3 – Third year winter 1999/2000 [wheat, berseem or faba bean followed by sesame in summer 2000 – winter 1999 / 2000 wheat , berseem or faba bean followed by sesame in summer 2000 - winter 1999/2000 wheat, berseem or faba bean followed by peanut in summer 2000 ] .
4 – Fourth year 2000/2001 [the same crops of the first year].
5 – Fifth year 2001/2002 [the same crops of the second year].

Rotation was realized at the fourth and fifth year where sesame planting was repeated in 2/3 of the land in the 3-year rotation and in 1/2 of the land in the 2–year rotation.

Physical and chemical properties of the experimental soil are shown in Table (1).

A split plot design with four replications was used, whereas crop rotations were assigned in main plots, while preceding winter crops were arranged in the sub plots. Plot area was 28.8$m^2$ consisting 12 rows 60 cm apart and four meters long. Peanut seeds Giza 4 were planted 20 cm between hills on one side and were thinned at two plants per hill after two weeks from planting, 200 kg / fad of calcium super phosphate (15.5% $P_2O_5$) were applied during land preparation. Nitrogen fertilizer was added in three equal doses at the rate of 45 kg N/fad as ammonium sulphate ( 20.6%N ), the first dose was added at planting, the second one was added after thinning , while, the third dose was added before flowering stage. Potassium sulphate 48% $K_2O$ was added at the rate of 48kg $k_2O$/ fad in two equal doses, th

first dose at sowing of peanut and the second dose was one month later. Irrigation was practiced every six days for peanut using sprinkler irrigation for all crops. The recommended culture practices for growing peanut and the other crops were followed.

At harvest time of peanut, ten guarded plants were taken at random from the second and the third inner rows of each sub plot to estimate yield attributes, whereas, seed yield / fad was estimated from the yield of peanut plants grown on the inner six rows and converted to seed yield / fad.

The following data were recorded: plant height (cm), number of branches/ plant, number of pods / plant, number of seeds / 100 – pods, weight of pods / plant (g) , 100 – seed weight, seed yield/ plant (g) , seed yield / fad (kg) , oil % and protein % . Seed oil percentage was determined according to A.O.A.C (1965) using soxhlet apparatus with petroleum ether as an organic solvent. Protein percentage was calculated by multiplying nitrogen percentage by 6.25 which was determined using micro kjeldahal method as described by Pregl (1945).

All collected data of 2001 and 2002 seasons were statistically analyzed according to the procedure of ANOVA outlined by Gomez and Gomez (1984). Also, the combined analysis was practiced over the two seasons whenever the homogeneity of variances was detected. The simple correlation coefficient was calculated between each of all studied characters according to the same method. To compare the treatment means, L.S.D at 5% level of probability was used.

## RESULTS AND DISCUSSION

### I – Effect of crop rotation on yield and yield attributes of peanut.

The average data of the two growing seasons as well as the combined data of peanut plants as affected by the three patterns of crop rotation i.e. monoculture, 2 – year and 3 – year rotation are shown in Table (3) .

The data in Table (3) reveal that plant height, number of branches/ plant, number of pods /plant, number of seeds / 100 – pods, weight of pods / plant, 100 –seed weight, seed yield/plant, seed yield/ fad and seed protein percentage of peanut plants were significantly affected by the rotation patterns in both seasons as well as the combined analysis. The

**Table ( 3 ): Effect of crop rotation on yield attributes , seed yield and seed oil and protein percentage in 2001 , 2002 seasons and combined data .**

| Characters / Crop rotations | Plant height cm | No. of branches / plant | No. of pods / plant | No. of seeds / 100 – pods | Weight of pods / plant ( g ) | 100 – seed weight ( g ) | Seed yield / plant ( g ) | Seed yield / fad ( kg ) | Oil % | Protein % |
|---|---|---|---|---|---|---|---|---|---|---|
| **2000 season** | | | | | | | | | | |
| Monoculture | 64.85 | 9.38 | 21.10 | 136.32 | 30.86 | 73.38 | 20.44 | 734.89 | 45.21 | 21.40 |
| 2 – year rotation | 64.99 | 10.06 | 21.80 | 145.19 | 32.03 | 77.31 | 24.79 | 843.26 | 44.87 | 23.07 |
| 3 – year rotation | 69.79 | 10.25 | 23.27 | 155.23 | 40.60 | 82.19 | 29.06 | 1007.00 | 44.25 | 23.87 |
| L . S D at 0.05 | 2.39 | 0.73 | 1.26 | 5.36 | 3.36 | 3.35 | 2.07 | 32.56 | N . S | 1.13 |
| **2001 seasons** | | | | | | | | | | |
| Monoculture | 64.03 | 9.21 | 21.14 | 137.81 | 32.31 | 73.04 | 21.94 | 745.54 | 45.22 | 22.12 |
| 2 – year rotation | 66.53 | 10.15 | 22.59 | 146.97 | 37.97 | 77.39 | 25.33 | 852.94 | 45.07 | 22.32 |
| 3 – year rotation | 66.09 | 11.82 | 23.30 | 152.49 | 43.61 | 85.64 | 31.00 | 1048.81 | 45.60 | 23.32 |
| L . S . D at 0.05 | 2.03 | 1.03 | 1.14 | 6.54 | 3.87 | 2.47 | 3.12 | 58.17 | N . S | 1.04 |
| **Combined** | | | | | | | | | | |
| Monoculture | 64.44 | 9.29 | 21.12 | 137.07 | 31.58 | 73.21 | 21.19 | 740.55 | 45.21 | 21.76 |
| 2 – year rotation | 65.76 | 10.11 | 22.19 | 146.06 | 35.00 | 77.35 | 25.06 | 851.85 | 44.98 | 22.69 |
| 3 – year rotation | 67.94 | 11.03 | 23.28 | 153.86 | 42.11 | 83.92 | 30.03 | 1024.90 | 44.93 | 23.60 |
| L . S D at 0.05 | 3.30 | 1.25 | 1.71 | 6.44 | 2.52 | 2.35 | 1.85 | 47.76 | N . S | 1.12 |

highest values of all these traits were produced by application of 3– year rotation comparing with monoculture and 2 – year rotation. The differences among each of monoculture, 2 – year rotation and 3 – year rotation were significant in number of seeds/ 100 – pod, weight of pods/ plant, 100 – seed weight, seed yield/ plant and seed yield/fad, while the differences between the monoculture and 2 – year rotation were insignificant in plant height, number of branches / plant and number of pods / plant according to the combined analysis of data.

The three rotation patterns had insignificant effect on seed oil % of peanut.

The superiority of 3 – year rotation may be due to improve the physical and chemical properties of the soil as shown in Table (1) which indicated that application of crop rotation increased the values of available nitrogen, phosphor and potassium as well as organic matter, while decreased the values of bulk density of the soil . These beneficial improvements may lead to more growth and yield of peanut plants. In this concern Crookston and Kurle (1989) found that, under some circumstances alternation one crop with another may result in beneficial differences in soil moisture, physical properties of the soil, weeds, insects, diseases and plant nutrition. Also, they added that the residues of alternate crops had a stimulatory effect on one another under rotation system. This may explain the increases in yield attributes and yield when peanut plants were grown in 3 – year rotation. These excesses of 3 – year rotation in seed yield / fad were estimated by 20.31% and 38.40 % comparing to monoculture and 2 – year rotation, respectively (as a combined data) . These results are in harmony with those obtained by Badr (1971), Peterson and Varvel (1989), Varvel and Peterson (1990) , Aly et al (1993 ) , Copeland et al (1993) , Jicheng et al (1998) and Gabr et al (1999).

**II - Effect of preceding winter crops on yield and yield attributes of peanut.**

The data in Table (4) indicate that the preceding winter crops i.e.: - faba bean, berseem and wheat had significant effects on plant height, number of branches/ plant, number of pods / plant, number of seeds/100 – pod, weight of pods/ plant , 100 – seed weight ,

**Table ( 4 ) : Effect of preceding winter crops on yield , yield attributes and oil and protein percentage of peanut in 2001 , 2002 seasons and combine data**

| Characters / Preceding crop | Plant height cm | No. of branches / plant | No. of pods / plant | No. of seeds / 100 – pods | Weight of pods / plant ( g ) | 100 – seed weight ( g ) | Seed yield / plant ( g ) | Seed yield / fad ( kg ) | Oil % | Protein % |
|---|---|---|---|---|---|---|---|---|---|---|
| 2000 season | | | | | | | | | | |
| faba bean | 69.42 | 10.07 | 21.87 | 147.30 | 34.24 | 78.12 | 25.17 | 859.88 | 44.34 | 22.93 |
| berseem | 68.05 | 10.91 | 22.47 | 148.48 | 38.07 | 79.32 | 27.35 | 946.56 | 44.80 | 23.26 |
| wheat | 62.16 | 8.71 | 21.57 | 140.96 | 31.68 | 75.43 | 21.77 | 786.88 | 45.21 | 22.14 |
| L . S D at 0.05 | 2.31 | 1.22 | 0.81 | 3.62 | 2.73 | 1.65 | 1.83 | 51.26 | N . S | 0.94 |
| 2001 season | | | | | | | | | | |
| faba bean | 69.38 | 11.14 | 21.88 | 147.79 | 38.50 | 79.30 | 26.42 | 903.97 | 45.69 | 22.71 |
| berseem | 65.12 | 11.01 | 23.74 | 151.03 | 40.92 | 81.27 | 28.24 | 964.20 | 45.19 | 23.34 |
| wheat | 62.14 | 9.02 | 21.49 | 138.41 | 34.64 | 75.51 | 23.61 | 773.12 | 45.01 | 21.71 |
| L . S .D at 0.05 | 2.16 | 1.12 | 1.24 | 4.13 | 2.86 | 1.84 | 2.01 | 64.14 | N . S | 1.05 |
| Combined | | | | | | | | | | |
| faba bean | 69.40 | 10.61 | 22.01 | 147.55 | 36.37 | 78.71 | 25.79 | 881.93 | 45.01 | 22.82 |
| berseem | 66.59 | 10.96 | 23.10 | 149.75 | 39.49 | 80.29 | 27.79 | 955.38 | 45.00 | 23.30 |
| wheat | 62.15 | 8.86 | 21.49 | 139.68 | 33.16 | 75.47 | 22.69 | 780.00 | 45.11 | 21.93 |
| L . S. D at 0.05 | 2.52 | 1.08 | 1.32 | 4.02 | 2.61 | 1.48 | 1.90 | 45.51 | N . S | 1.22 |

seed yield/plant, seed yield / fad and oil percentage. Peanut plants grown after faba bean showed the highest values of plant height and the lowest ones of oil percentage, while peanut plants grown after berseem exhibited the highest values of number of branches / plant, number of pods / plant, number of seed / 100 – pod, weight of pods / plant, 100 – seed weight, seed yield / plant, seed yield/fad and seed protein percentage. The differences between faba bean and berseem as a preceding crops were insignificant except on plant height, weight of pods / plant, 100 – seed weight, seed yield / plant, and seed yield/ fad (combined data). Peanut plants grown after berseem out yielded that after faba bean or wheat by 8.33% and 22.48 %, respectively (as a combined data), and this may be due to increase in number of nuts/fad after berseem or faba bean than after wheat as a cereal crop. The data in Table 1 supported these results, where values of organic matter, nitrogen, phosphor and potassium were increased in soil after legumes comparing with after wheat, also bulk density was lower after legume crops than that after wheat. These results may be contribute much to the fact that berseem and faba bean as legume crops which enriching the soil with nitrogen and organic matter as well as the residues of legumes for improving the physical, chemical and biological properties of the soil. Badr (1971) found that, yield of peanut grown after faba bean and berseem outyielded that grown after wheat or barley. Also, El-Debaby et al (1984) indicated that legume crops increased nitrogen percent in the soil and legume residues contained higher nitrogen percent than non- legume crops. On the other hand, Greish (1998) showed that preceding crops, i.e., faba bean and wheat did not affect significantly growth, yield, oil and protein contents of peanut plants. Similar results were recorded by Trepache et al (1991), Aly et al (1993), Ghosh and Singh (1995), Sherif et al (1995), Singh et al (1996), Gabr (1998) and Gabr et al (1999).

**III - The effect of the interaction between crop rotation and proceeding winter crops on some characteristics of peanuts.**

The combined data revealed that the effect of the interaction between crop rotation and preceding winter crops were

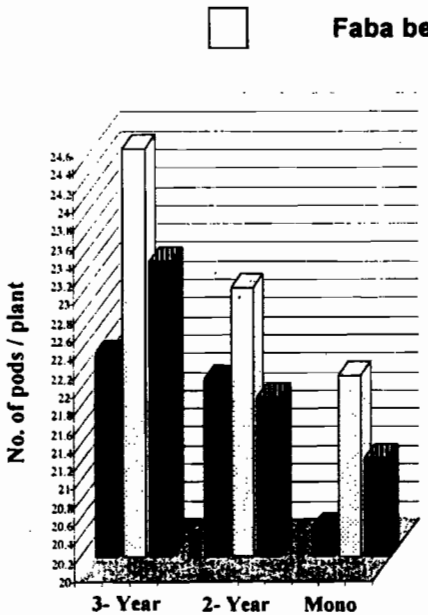


**Fig. (1)** The effect of the interaction between crop rotation and preceding crops on No. of pods / plant .

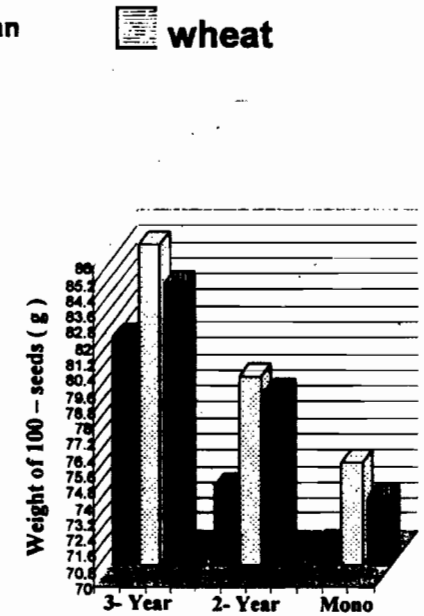


**Fig. ( 2 )** The effect of the interaction between crop rotation and preceding crops on weight of 100 – seeds .

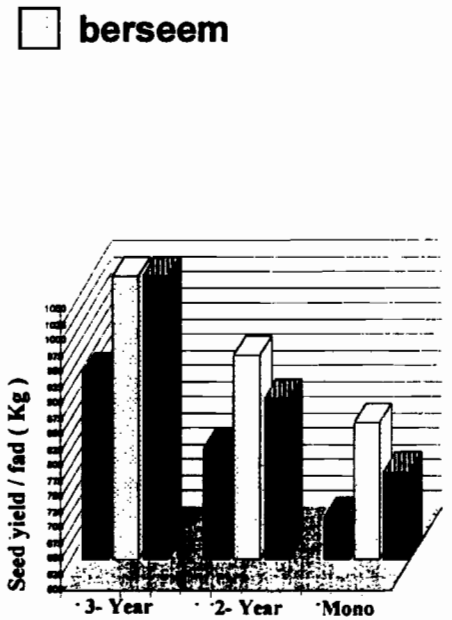


**Fig. ( 3 )** The effect of the interaction between crop rotation and preceding crops on seed yield / fad .

**Table ( 5 ) : Simple Correlation Coefficient values for all pairs of characters of peanut over crop rotation and preceding ( combined data )**

| | Plant height , | No . of branches / plant | No . of pods / plant | No . of seed / 100 pod | Weight of pods / plant | 100 – seed weight | Seed yield / plant | Seed yield / fad | Oil % | Protein % |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | 0.859 * | 0.172 N.S | 0.720 * | 0.668 N . S | 0.655 N.S | 0.674 N . S | 0.673 N . S | - 0.642 * | 0.708 * |
| 2 | | | 0.883 * | 0.904 * | 0.107 N . S | 0.867 * | 0.913 * | 0.917 * | - 0.786 * | 0.922 * |
| 3 | | | | 0.888 * | 0.968 ** | 0.910 ** | 0.962 ** | - 0.965 ** | - 0.857 * | 0.917 * |
| 4 | | | | | 0.933 * | 0.962 ** | 0.985 * | - 0.979 ** | - 0.877 * | 0.950 ** |
| 5 | | | | | | 0.955 ** | 0.977 ** | - 0.982 ** | - 0.839 * | 0.942 * |
| 6 | | | | | | | 0.980 ** | - 0.978 ** | - 0.851 * | 0.957 ** |
| 7 | | | | | | | | - 0.999 ** | - 0.869 * | 0.959 ** |
| 8 | | | | | | | | | - 0.847 * | 0.956 ** |
| 9 | | | | | | | | | | - 0.873 * |
| 10 | | | | | | | | | | |

* and ** : significant at 0.05 and 0.01 level of probability .

N . S : insignificant .

significant on number of pods/plant, weight of 100-seed and seed yield/fad. As illustrated in Figs (1,2 and 3), the highest values of number of pods / plant , weight of 100 – seeds and seed yield / fad were obtained by growing peanut in 3 – year rotation after berseem, while the lowest values of these traits were obtained by planting peanut in monoculture after wheat. It is worthy noted that growing peanut in momoculture after berseem outyielded that grown in 2 – year rotation after wheat.

It is obvious that the response of seed peanut yield / fad to the effect of preceding crops was affected by crop rotation patterns where the superiority of seed yield after berseem comparing with that after faba bean or wheat were 10.66% and 22.73% in monoeulture ; 7.97% and 18.98% in 2 – year rotation and 6.98% and 25.33% in 3 – year rotation. Results of Gabr (1998) and Gabr et al (1999) are in harmony with those obtained herein.

**VI-Correlation coefficient among different yield attributes:**

Simple correlation coefficients among all studied traits are presented in Table ( 5 ) . With regard to seed yield/ fad, data revealed highly positive and significant correlation with all characters except plant height, which was positive but insignificant. Also, seed yield /plant was significantly positive correlated with each of number of branches and pods / plant , number of seeds/ 100 – pod, weight of pods/ plant and 100 – seed weight , while negative correlation coefficient was detected among oil percentage and all studied characters of peanut . Positive but insignificant correlation coefficient was observed between plant height and each of number of pods / plant, weight of pods/ plant , 100 – seed weight, seed yield/plant and seed yield / fad , also insignificant positive correlation between number of branches / plant and number of pods/ plant. These results of correlation coefficient among seed yield / fad and each of all studied traits indicate that the selection for these traits would lead to increase seed yield of peanut. Similar results were recorded by Gabr et al ( 1999 ).

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## دراسات على تأثير الدورة الزراعية والمحاصيل الشتوية السابقة على محصول الفول السوداني في الأراضي الرملية

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أجريت عدة تجارب على الدورة الزراعية والمحصول الشتوي السابق حيث بدأت عام ١٩٩٧ / ١٩٩٨ حتى عام ٢٠٠١ / ٢٠٠٢ بمحطة البحوث الزراعية بالإسماعيلية – مصر وذلك بهدف دراسة تأثير الدورات الزراعية ( زراعة متكررة ، دورة ثنائية ودورة ثلاثية ) ، وكذلك المحصول الشتوي السابق ( برسيم مصري صنف مسقاوى ، فول بلدي صنف ٤٦١ و قمح صنف سخا ٦٩ ) على محصول الفول السوداني صنف جيزة ٤ – صممت التجربة فى تصميم القطع المنشقة في أربعة مكررات حيث وضعت الدورات

الزراعية فى القطع الرئيسية ووضعت المحاصيل الشتوية السابقة في القطع الشقية وكان نظام الري المتبع في جميع المحاصيل هو الري بالرش حيث تم ري جميع المحاصيل الشتوية والصيفية كما هو متبع في ظروف المنطقة وتم ري الفول السوداني كل ٦ أيام طبقا للظروف الجوية والأرضية بالمنطقة .

أخذت النتائج على محصول الفول السوداني للموسمين الأخيرين فقط عامي ٢٠٠١ و ٢٠٠٢ بعد ان تحققت الدورة الثلاثية فى العام الرابع وكذلك فى العام الخامس من خلال تكرار زراعة السمسم فى ثلثى الأرض فى الدورة الثلاثية وفى نصف الأرض فى الدورة الثنائية ، وتم تحليل النتائج إحصائيا ، كما تم إجراء التحليل المشترك للموسمين .

وفيما يلى أهم النتائج المتحصل عليها طبقا للتحليل المشترك الذي يوافق نتائج الموسمين :

١ – أوضحت النتائج أن استخدام النظم المختلفة للدورات الزراعية كان له تأثير معنوي على كل صفات الفول السوداني المدروسة وهى : ارتفاع النبات وعدد الفروع / نبات ، وعدد القرون / نبات ، وعدد البذور / ١٠٠ قرن ووزن القرون / نبات ووزن ١٠٠ بذرة ومحصول البذور / نبات ومحصول البذور / فدان والنسبة المئوية للبروتين في البذور في حين كان تأثيرها غير معنوي على النسبة المئوية للزيت في البذور .

٢ – أدى تطبيق الدورة الثلاثية للفول السوداني إلى الحصول على أعلى القيم في كل الصفات المذكورة ماعدا النسبة المئوية للزيت في البذور ، حيث تم الحصول على أعلى القيم نتيجة الزراعة المتكررة للفول السوداني .

٣ – اختلفت المحاصيل الشتوية السابقة معنوياً فيما بينها في تأثيرها على صفات الفول السوداني فيما عدا نسبة الزيت في البذور .

٤ – كان لزراعة الفول السوداني بعد المحاصيل البقولية أثر كبير في زيادة المحصول ومكوناته وخاصة بعد البرسيم الذي أدى إلي الحصول على أعلى القيم في كل من عدد الفروع / نبات وعدد القرون / نبات وعدد البذور / ١٠٠ قرن ، ووزن القرون / نبات ووزن ١٠٠ بذرة ومحصول البذور / للنبات ، ومحصول البذور للفدان والنسبة المئوية للبروتين فى البذور بفرق معنوي مع المحصول المنزرع عقب القمح – فى حين أدت زراعة الفول السوداني عقب الفول البلدي إلي الحصول على أعلى القيم لارتفاع نبات الفول السوداني . كانت الفروق بين الزراعة عقب البرسيم والزراعة عقب الفول البلدي معنوية في ارتفاع النبات ، ووزن القرون / نبات ووزن ١٠٠ بذرة ومحصول البذور للنبات والفدان فقط – إلا أنها كانت غير معنوية في باقي الصفات .

٥ – كان التفاعل بين نظم الدورة الزراعية والمحاصيل الشتوية السابقة معنويا في تأثيره على كل من عدد القرون للنبات ووزن ١٠٠ بذرة ومحصول البذور للفدان حيث تم الحصول على أعلى القيم في هذه الصفات باستخدام الدورة الثلاثية والزراعة عقب برسيم – وتجدر الإشارة إلى أن محصول البذور للفدان فى الزراعة المتكررة للفول السوداني عقب برسيم تفوق على الزراعة في دورة ثنائية عقب

محصول نجيلي ( قمح ) . في حين أدت الزراعة المتكررة عقب القمح للحصول على أقل القيم في الصفات السابقة .وبذلك نوصى بزراعة الفول السوداني عقب برسيم سواء فى الدورة الثنائية او الثلاثية.

٦ – تشير نتائج دراسة معامل الارتباط بين الصفات المختلفة لوجود ارتباط معنوي موجب بين محصول البذور للنبات والفدان ومساهمات المحصول التي يمكن الانتخاب على أساسها في حين كان معامل الارتباط بين محصول البذور للنبات والفدان مع ارتفاع النبات موجبا وغير معنوي . كما أن معامل الارتباط بين النسبة المئوية للزيت في البذور وكل الصفات المدروسة سالبا في حين كان موجبا بين نسبة البروتين والمحصول ومساهماته .