PEANUT ROTATION IN UNITED ARAB REPUBLIC

by

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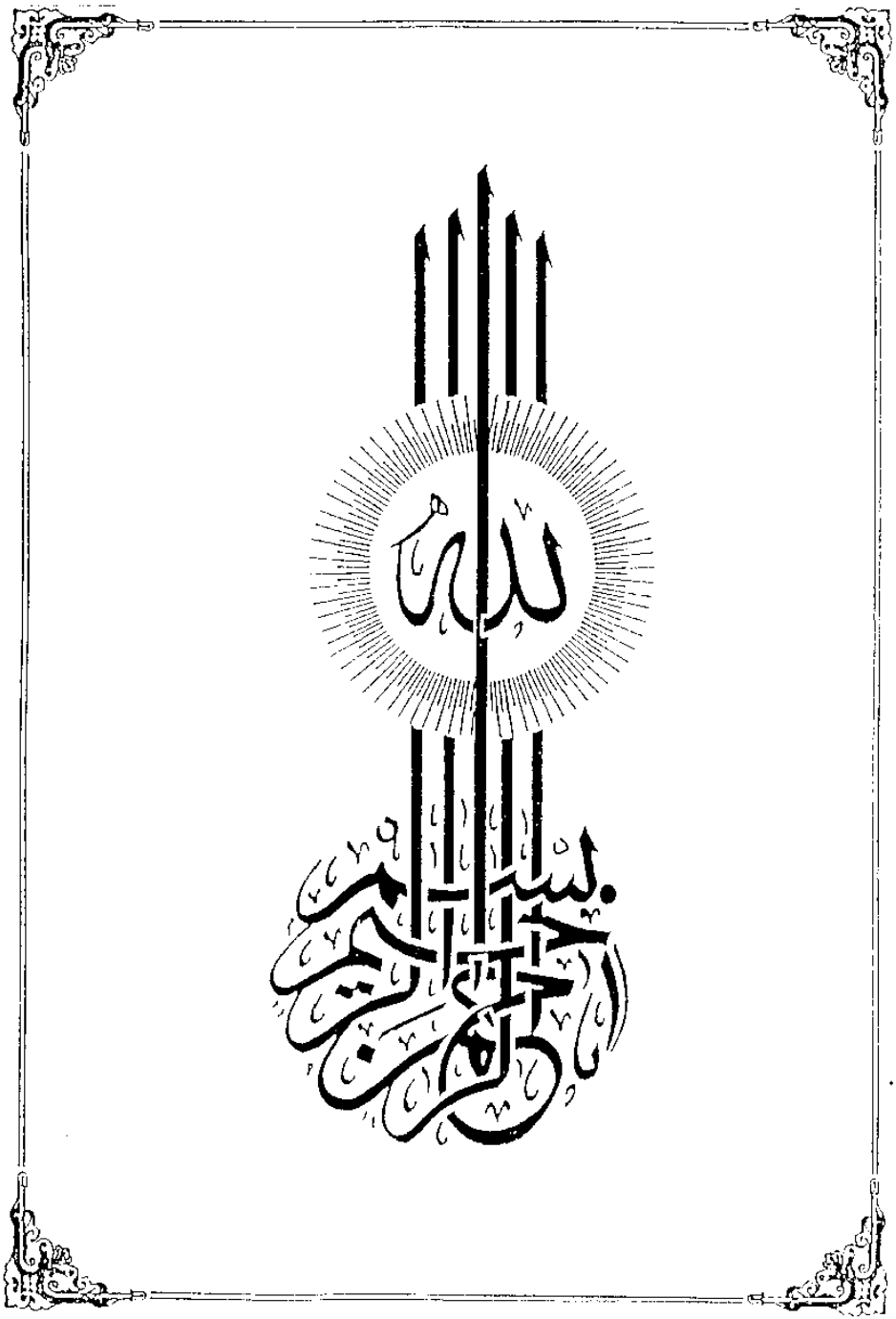

TABLE OF CONTENTS

SECOND PART

The effect of irrigation with soil extract on peanut and wheat plants

THIRD PART

The effect of different rotations of peanut on the soil productivity

I- ACKNOWLEDGEMENT

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II- INTRODUCTION

The rotation is one of the most important factors affecting soil productivity. Its objects of rotations could be considered under the headings of, the increase or maintenance of fertility, the economical distribution of labour through the year, the convenient sequence of the crops, the control of weeds and the control of plant diseases.

There are different rotations practised in U.A.R. varying mainly according to the soil type and the crop. In sandy soil, as well as sand loamy soil, peanut rotations are favourable.

The U.A.R. Government is pressing hard to increase the soil area by reclaming new soil especially sand soil which amounted to about 45% of the total reclamed area during the last decade.

In sand soil, many crops thrive well among which peanut, sesame and Egyptian lupin are the most important crops. By reclaming sand soil, other crops can be included in the rotation of such soil after being reclamed. This study was designed to investigate the comparison between different peanut rotations with regard to soil productivity. Due consideration was given to the effect of preceding winter crops on the yield of peanut.

III- REVIEW OF LITERATURE

Effect of crop rotation on some chemical and biological contents of the soil.

The residual effect of various crop rotations on the amount of nitrogen compounds and organic matter in the soil was studied by many investigators (7,23,25,35,38,40,41,43, 48,53,54,58,61,62,66,73,75,80,82,86,93,96,99,110,116,123, 130,136). The accumulation of nitrogen compounds in the soil differed greatly according to the kind of the crop. Legumes increased the amount of nitrogen compounds i.e. nitrates and nitrogen ion in the soil (53,62,66,75,132) as compared with non legume crops (3,73,75,130). There was an increase in the amount of nitrogen in soil planted with clover or lucerne (41,73,80), beans (116,136), soy-beans (96), berseem (trifolium alexandrinum L.) (2, 93), cowpea (54) and lupin or sweet clover (80). The nitrate content of the soil was 2-4 times greater after legumes than after barley and potatoes (62). Non legume crops caused a marked consumption of nitrogen content of the soil i.e. rotation with maize, wheat and barley (130), rotation which included sorghum or continuous cotton (75) and after wheat plants (93), and maize plants (23,25).

The amount of nitrogen added to the soil varied from one legume to another. Sutherland et al (123) found that

the amount of nitrogen supplied by legumes in a rotation on silt loam ranged from 123 to 200 lb/acre in 1957 and from 54 to 83 lb/acre in 1958. Beans added about 200 lb/acre of nitrogen (136), 32.2 Kgs/Fad. (116), soybean fixed up to 165 lb/acre (96), lucerne 316 Kgs/hec. annually, lupin 224 Kgs/hec., sweet clover 163 Kgs/hec. (80) and biomass of legumes accumulated up to 300 Kgs/hec. (62).

Clover had a better residual effect than grass on the succeeding crops (74). Red clover, alsike clover, sweet clover and alfalfa were superior to soybeans and field beans.

Ansorge (5) found that the residual effect of the preceding crop lasted more than two years but decreased with time. He added that the effect of the preceding crop on the next crop was greater than the effect of fertilizers.

The soil organic matter content decreased much faster when the land cropped to wide-spaced crops (maize) than to close-spaced crops (wheat) (86).

The soil after continuous maize cultivation for a number of years had the best nitrifying power of any of those had been studied, that after continuous wheat or oat cultivation, the capacity was a little greater, than that after crop rotation of various length - accumulation was

still greater, and the shorter the rotation the larger was the amount of nitrate formed in the soil (3). The system of rotation affected the yield of succeeding crops and the content of organic matter, nitrogen and C/N ratio of the soil (2,23,27,35,38,40,61,72,97).

The soil organic matter and C/N ratio were higher in rotations which included sorghum than any other system (75). The organic matter content of the soil was considerably higher in cover crops plots than in the plots without cover crops (95).

Miller (81) reported that L-aspartic acid and L-alanine applied to sterile soil increased plant growth. He added that eight to ten amino acids were secreted into the soil by the plants. Many investigators determined the amino acids content of soil after different rotations. The increase of amino acids inset was more affected by lucerne than by annual crops (125). The amino acids in plants with nodules grown under field conditions is several times higher than in plants without nodules (66). The content of aspartic acid, glutamic acid, alanine and glycine was greater in nodulated than in unnodulated beans especially during blossoming stage (31), after 14 days growth, no amino-n was detected from wheat plants, whereas 2-7 mg. of free amino acids

which were detected was 1.5 - 2.0 times higher from Rhizobium melilotic and B. cereus var. mycoides than in control. Opposite results were obtained with Azotobacter chroococcum (7).

Stevenson (122) found that the samples from the untreated corn-oats rotation plot contained higher amounts of basic amino acids than those from the treated rotation plot and from the grass border. The proportion of the soil nitrogen released as ammonia was higher at all time intervals for the soil from the continuous corn plot.

The action of growing plant roots i.e. welting and drying the soil contributed to the physical conditions of the soil (90). Soil aggregation increased by planting continuously wheat, blue grass, ladino clover, orchard grass pasture (38); the increase was linear by cropping with bromegrass or alfalfa for 4 years (119). The water stable aggregates increased by introducing a short term of clover into wheat-sweet potato rotation (61), bromegrass had approximately double the effect of alfalfa (119).

The composition and number of the rhizosphere microflora depend on the nature of the preceding crops. The microflora of winter wheat was twice as large after lupin-barley mixture as after potatoes (33). There was a general

correlation between the development of micro-organisms and wheat yield (52). The richest micro-bioflora was found in the rhizospores of lupins and grasses less in those of grains and hoed crops (33). Sorghum had a detrimental effect on the succeeding crop of wheat (26). Some investigators indicate that there was a detrimental effect of some crops on the succeeding plants due to the increase in number of micro-organisms in the soil (26,91), opposite results were obtained by Acharya et al (2) who found that berseem had a beneficial effect on the soil microflora.

Effect of crop rotation on yield of different crops.

Crop rotation had a great influence on the yield of the different crops. The preceding crops affected greatly the yield of wheat crop. Lowest winter wheat yield was obtained when cereal was the preceding crop as compared with legumes particularly pea (133), and maize or vetch-oats mixture (117), continuous fallows compared with legumes (118,124), silage maize compared with potatoes (132), lucerne lowest than vetch-oats mixture (40), maize compared with peas (77), maize and cowpeas compared with berseem-fallow or fallow-fallow with continuous cropping and current manuring practices (19),

compared with potatoes (135), clover or rape compared with sugar beet (63), soybeans compared with continuous cropping (130), compared with other legumes (34). High yield of wheat was obtained after legumes fertilized with P_2O_5 (98), legumes fertilized with nitrogen and phosphorus (94), legumes-grass (53), groundnuts (115). Preceding crop affected the quality of wheat grains. The inclusion of a legume in the rotation increased the protein content of the wheat grain (18) and wheat flour was better after legumes (124).

There was a very little difference between the acre grains when rotation or continuous cropping was practised (57). Seshadri et al (115) found that from 11 treatments, higher yields were obtained from cereals after groundnuts but usually the groundnut crop was less the following year. Thompson and Robertson (128) found that groundnuts in rotation with maize and green manure crops yielded 100 - 200 lb/acre more than continuous groundnuts. Diveker and Kurtakoti (32) found that higher yields of groundnuts was obtained after cotton and sorghum vulgare.

The yield of corn following soybeans was much lower than those following after legumes (34). Rotations with soybeans (130,113), velvet beans and cowpeas (120), plowing