# EVALUATION OF SOME RAPESEED CULTIVARS PERFORMANCE TO WATER REQUIREMENTS AND FERTILIZATION IN LIGHT SOILS



By

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## Approval sheet

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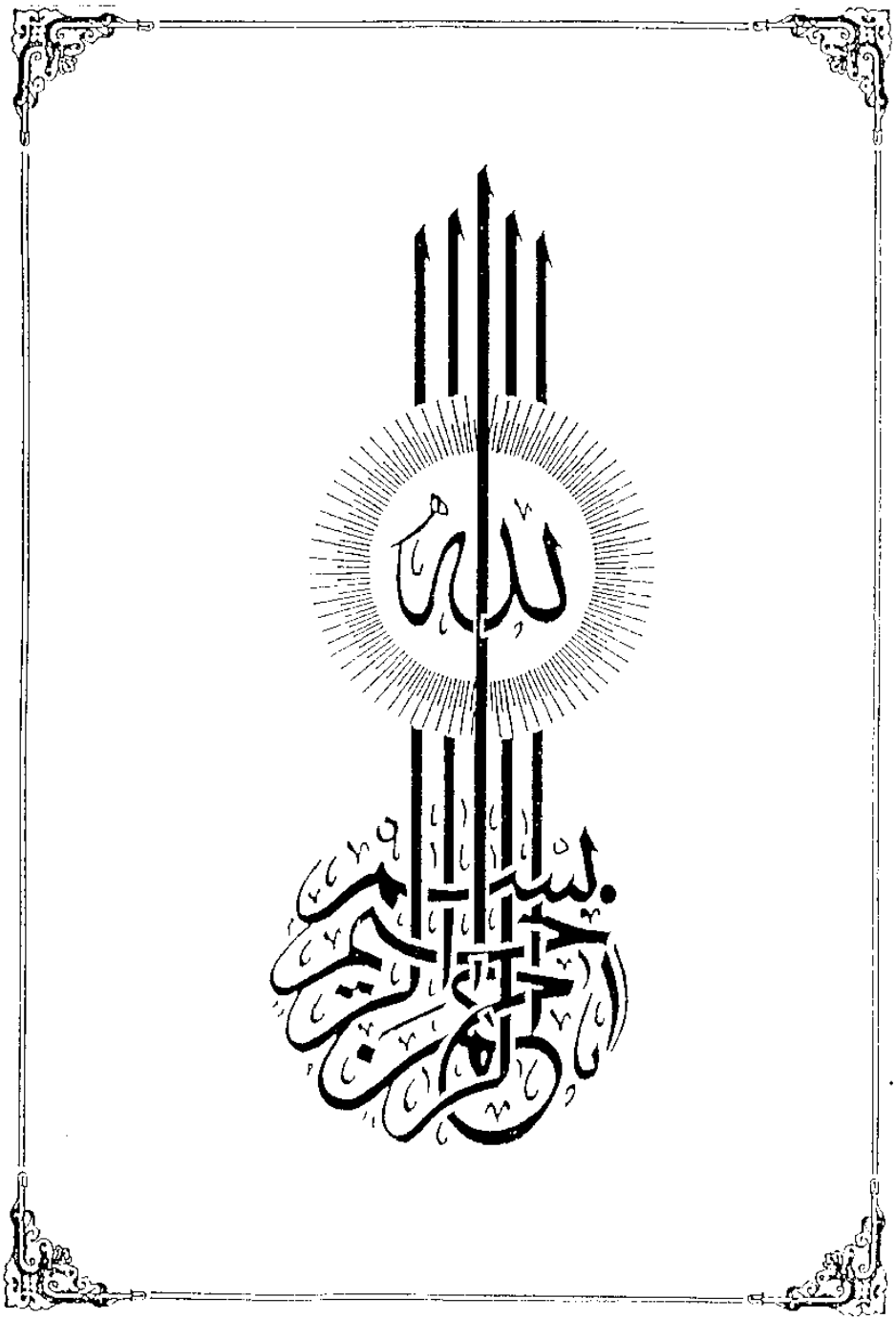

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## ABSTRACT

Three field experiments were carried out at South Tahrir Region in 1988/89, 1989/90 and 1990/91 growing seasons. In the first season, the experiment included 10 rapeseed cultivars to study varietal differences and their performance under sandy soil at South Tahrir Region conditions.

In the second and third seasons, the two promising cultivars characterized by relatively highest seed yield/fed. and had approximately zero erucic acid (i.e Linetta and Liraspa cultivars) were chosen to study their response to irrigation intervals from flowering up to harvesting, rates and time of nitrogen applications. In each season, every cultivar was planted in a single experiment. Every experiment included 12 treatments which were the combination of two irrigation intervals, three rates of nitrogen fertilizer and two nitrogen application times.

**The results could be summarized as follows:**

Irrigation every 5 days interval from flowering to harvesting increased significantly seed yield/fed. of Liraspa cultivar. But seed yield/fed. of Linetta reached the highest value by irrigation every 10 days interval from

flowering to harvesting. The maximum oil and protein yield (kg/fed) for Liraspa cultivar was obtained by adding 120 kg N/fed. in three equal portions and irrigated every 5 days interval from flowering to harvesting, while maximum carbohydrate yield/fed was obtained by application 90 kg N/fed. at three equal portions and irrigated every 5 days interval from flowering to harvesting.

The combination of nitrogen doses x time of application affected significantly seed yield, biological yield/fed. of Liraspa and maximum values for the same characters were obtained by adding nitrogen fertilizer at 120 kg N/fed in three equal portions.

Seed yield/fed of Linetta was not affected by nitrogen rate and time of application while biological yield/fed and straw yield of Linetta were increased significantly, reaching the maximum value by adding 150 kg N/fed. at three equal portions.

Regarding cultivar Linetta, maximum yield of oil and protein yield kg/fed were recorded by increasing nitrogen fertilizer up to 150 kg N/fed in three equal portions for plants irrigated every 10 days interval during the period extending from flowering up to harvesting while adding 90 kg N/fed. at three equal portions and every 10 days interval after flowering to harvesting produced the highest carbohydrate yield (kg/fed).

Correlation coefficients of seed yield of Liraspa cultivar were significant in association with pod yield, biological yield, straw yield, harvest index, crop index, hull %, oil yield, protein yield and carbohydrate yield/fed. The previous characters in addition to plant height as well as seed oil percentage as for Linetta cultivar had positive and significant correlation coefficients with seed yield per feddan.

Results of path coefficient and coefficient of determination revealed that the most important characters contributing seed yield variation were biological yield and straw yield for Liraspa and pod yield as well as biological yield as to Linetta cultivar.

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# INTRODUCTION

In Egypt, there is a wide gap between the production of vegetable oil and its consumption. In the last decade, the average production was 164100 tons and the consumption amounted up to 621350 tons*. Presently,the gross revenue of production has represented about 13.29% of the total consumption which has created a dire need for importation. Overcoming this deficit, it is very important to increase the vegetable oil production horizontally and vertically as well through upgrading the average yield per unit area.

It is impossible to relay on traditional crops to provide the population with their future requirements of vegetable oil since it is difficult to increase their cultivated area throughout the old valley. The reclaimed soils which suffer from water and nitrogen deficiencies can be cultivated with some oil crops which could be grown under water deficiency without great damage to the growth and yield such as canola (rapeseed). The soils located out of the old valley like south Tahrir Region seems to be one of the most promising soils.

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* Agric. Economics Res. Inst. (Underpublished data, 1992), Giza, Egypt.

Oilseed rape (*Brassica napus* L.) is an important oil crop in the world. It shared by 8% of the total world oil production (Robbelen *et al.* (1989). It contains about 40-50% oil and 20% protein. New varieties which have low level of both erucic acid in oil and glucosinolates meal make it preferable for human being food and animals feed.

This study was carried out to evaluate the performance of some rape cultivars under different treatments of irrigation and nitrogen fertilization at South Tahrir Region conditions.

# REVIEW OF LITERATURE

## I. Effect of irrigation:

### 1. Growth criteria:

Different experiments were carried out to asses the response of rape growth to irrigation.

Providing turnip rape (*Brassic campestris*) with water by growing under four levels of irrigation produced more than doubled yield through producing greater plant growth, more pods, more seeds per pod and larger seeds than without irrigation (Krogman and Hobbs, 1975).

Irrigation increased pods number per plant of rapeseed (Clarke, 1978).

Under 3 water regimes, the leaf area index, number of branches per plant, number of pods per plant, number of seeds per pod, pod surface area and crop growth rate of rape (*Brassica napus*) cultivar "Tower" increased by irrigation as reported by Clarke and Simpson (1978).

Joarder *et al.* (1979) showed that irrigation mustard (*Brassica juncea*) cultivars "Rai 7, Laha 101 and Rai 5" increased the number of primary and secondary branches, pods and seeds/plant.

Reddy and Sinha (1989) reported that application of 1 or 3 irrigations increased the nitrogen uptake in seeds and stalks of *Brassic juncea* compared to untreated controls.

Number of pods/plant was significantly decreased with increasing depletion levels (Abd El-Hafeez *et al.*, 1990).

2. Yield and its attributes:

The yield is the out put of plant genetical make up and the environmental conditions among which soil moisture content is one of the most important factors

Mathur and Tomar (1972) noticed that the time as well as the number of irrigations influenced the yield of raya. Two irrigations applied at the preflowering (after 40 to 45 days from sowing) and at the post flowering (at 80 to 85 days after sowing) of raya (*Brassic juncea*) were recommended. The irrigation requirement of raya was 32 cm, which could be splitted at pre- and post sowing applications.

Nuttall (1973) indicated that low (100 mbars) soil moisture tension gave higher yields of "Target rape" (*Brassica napus*) than high (151 mbars) moisture tension.

Maintaining soil moisture in the upper half of available range until pod ripening produced maximum yield of *Brassica campestris* cultivar "Span" as concluded by Krogman and Hobbs (1975).

Bhan and Dhama (1977) studied the effect of 1, 2 or 3 irrigations by scheduling either to critical growth stages or to climatic needs on Indian mustard (*Brassica juncea*)

cultivar "Varuna" and "KI". They indicated that increasing the number of irrigations increased seed yield of cultivar "KI" whereas, cultivar "Varuna" had no further yield response with increasing the number of irrigations from 2 to 3. One or two irrigations were applied to climatic needs proved more effectiveness on seed yield of studied varieties.

Singh *et al.* (1977) reported that the seed yield of Sarson (*Brassica napus* variety glauca) and raya (*Brassica juncea*) were not significantly affected by soil profile saturation levels of 100, 75, 50 or 25% corresponding to 100, 75, 50 and 25 mm of pre-sowing irrigation and or the application of 0-50 kg/ha each of nitrogen and phosphorus. However, increases NP rates and in level of pre-sowing irrigation produced significant increases in yields when an irrigation of 25 mm was given at the flowering and seed filling stages indicating that benefits of the pre-sowing irrigation levels and NP rates derived by the plants initially were considerably reduced when they were subjected to soil moisture stress at the critical stage.

Rape yields were increased nearly four times by treating plants with combinations of irrigation and nitrogen fertilizer than application of any of them as a single (Henry and MacDonald, 1978).

An analysis of the yield components of rape was carried out by Clarke and Simpson (1978) under field conditions.