EFFECTS OF DIFFERENT LEVELS OF IRRIGATION ON THE YIELD OF A CROP OF RAPE (BRASSICA NAPUS, L. VAR. MIDAS) IN SOUTH-EAST SPAIN.

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INTRODUCTION

Due to the outcome of the first experiments carried out with rapeseed by the National Department of Oilseed Crops it was proposed to start an investigation of the incidence of different irrigation levels and of the moment of their application within the biological cycle of the plant, on the distinct parameters of the production.

Work of this mature has been undertaken in Canada by Shaykewich (1973); in France by Rollier (1974); in Sweden by Linner (1974) and in Czechoslovakia by Stehlik (1974).

The results obtained on the response of a rapeseed crop (Brassica napus L. var. Midas) at different irrigation levels are presented in this work.

MATERIALS AND METHODS

The variety was cultivated in an experimental zone situated in south-east Spain (Córdoba), where the soil was classified as "typic xerofluvents" (U.S.D.A. 1975).

Before sowing the plots were manured at the rate of 35 units of Nitrogen, 130 units of Phosphorus and 130 units of Potassium per hectares; on March 25, when the crop was found in the "rosette" stage, the plots were newly manured with 35 units of Nitrogen per hectare. They were also treated with insecticide (Clordinol) at the rate of 52 kg/ha before sowing.

The experiment was designed to study the effect of distinct levels of irrigation applied in the floration-maturity period on the basis of the daily evapotranspiration of the crop (ETP). This ETP was measured by means of a Thornthwaite's Lysimeter battery (Thornthwaite and Wilm, 1954) of 4 m^2 of controlled area each one.

The treatments correspond to the following irrigation levels:

Treatment A. - Supply a quantity of water equivalent to 135% of the evapotranspiration volume. These plots were watered 4 times during the period studied.

Treatment B. - Supply a quantity of water equivalent to 100% of the evapotranspiration volume. Four irrigations at the same period of time.

Treatment C. - Supply water at 55% of evapotranspirated volume. Two irrigations in a period of 10 days before and 10 days after floration.

Treatment D. - Supply water at 30% of evapotranspirated volume. One irrigation 10 days before floration.

This experiment was designed in a randomized block system, with four repetitions per treatment. The elemental plot measured 16 x 9 m, and in the harvest time two rows of each side were put aside and one metre in each extreme. The harvesting was made by hand, mowing and leaving the sheaves on the plot area. Four days later the sheaves were recollected with a combine harvester.

The experimental plots and lysimeters were sown February 15. The seedling occurred on February 24 in good conditions. The bloom appeared on April 28 and the harvesting was carried out June 26.

Average daily temperatures during this period ranged from 9.0°C to 23.1°C; relative humidity averaged from 70% to 85%; average radiation ranged from 283 to 450 cal/cm^2; wind speed was 50 to 173 km/day. Total precipitation during the period was 278 mm.

RESULTS AND DISCUSSION

The schedule of the different irrigation treatments is shown in Table 1.

TABLE 1

IRRIGATION SCHEDULE AND TOTAL WATER SUPPLY (mm)

Date	Treatments			
	A	B	C	D
April 23	60.0	45.0	60.0	60.0
May 7	60.0	45.0	60.0	--
June 4	90.0	67.5	--	--
June 12	85.0	60.0	--	--
Total irrigation water	295.0	217.5	120.0	60.0
Rainfall (mm)	278.0	278.0	278.0	278.0
Total water supply	573.0	495.5	398.0	338.0

Treatment A = 135% ETP Treatment B = 100% ETP
Treatment C = 55% ETP Treatment D = 30% ETP

The total volume of water evapotranspirated and measured in the lysimeter under a constant freatic level (100 cm deep) reached for the rape crop 492.6 mm. Maximum evapotranspiration rate of the crop was observed in the first 10 days of June, when it reached 12.0 mm daily. The 20% of total evapotranspiration occurred in the first stage of growth (seedling to flowering) and the other 80% was evapotranspirated during the period from flowering to harvesting.

The seed yield reached by the plots that were irrigated according to the 100% ETP (Treatment B, 495.5 mm) were significantly different from the yield reached in the treatment irrigated with 55% and 30% ETP. An increase of the irrigation level above 100% ETP did not increase the seed production in those treatments (See Table 2). A high correlation coefficient ($r = 0.904$) was encountered for seed production and water supply.

TABLE 2

SEED YIELD (kg/ha)

Blocks	Treatments			
	A	B	C	D
I	2,594	2,511	2,396	2,174
II	2,486	2,786	2,416	2,175
III	2,767	2,906	2,163	2,434
IV	2,601	2,570	2,383	2,168
Mean	2,612 a	2,693 a	2,340 b	2,238 b

As regards the oil seed content it is important to say that significant differences between the different irrigation treatment were not observed (Table 3).

TABLE 3

OIL CONTENT OF SEEDS (%)

Blocks	Treatments			
	A	B	C	D
I	35.77	35.26	39.97	26.62
II	40.12	38.75	33.63	36.79
III	32.99	31.93	30.12	43.10
IV	37.80	27.99	40.88	38.17
MEAN	36.67 a	33.49 a	36.15 a	36.17 a

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