

RESPONSE OF RAPESEED TO NITROGEN FERTILISATION IN A MEDITERRANEAN ENVIRONMENT

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1. Introduction. Portugal needs urgently to increase the production of vegetable oils to be able to meet the mandatory 10% minimum target to be achieved by all member states for the share of biofuels in transport petrol and diesel consumption by 2020 (Directive 2009/28/EC).

Rapeseed oil is the main raw material used in Europe for the manufacture of biofuels. Portugal, however, does not produce rapeseed oil, in spite of some studies have indicated that there are favourable ecological conditions to do that around the country [1, 2].

Nitrogen is one of the most determinant ecological factors that promote the crop yield. However, excessive nitrogen fertilisation represents an additional energy consumption and may causes the contamination of ground waters through nitrate leaching and may lead to the emission of environmentally relevant nitrogenous gases to the atmosphere [3].

In this work, results of a nitrogen fertilisation field trial are reported, where several nitrogen rates were applied at pre-plant and top-dress, to establish the better recommendation program for this crop.

2. Experimental. The field trial took place in Bragança (NE Portugal) in the winter-spring growing season of 2009/2010. A combination of ten fertilisation treatments (pre-plant plus top-dress) were imposed on a soil loamy textured. Soil inorganic nitrogen content and nitrogen nutritional status of plants were monitored during the growing season. Seed yield and N uptake were recorded and used to estimate indices of N use efficiency.

3. Results and Discussion. The comparison of seed DM yields between the 50:0 and 0:50 treatments (for instance) clearly showed that top-dress N fertilisation was more effective in improving seed DM yield than pre-plant N fertilization (table 1). Apparent N recovery was also higher for the 0:50 N treatment (55.3%) in comparison to the 50:0 treatment (7.4%).

Table 1. Dry matter (DM) yields of straw and seed, N uptake (Nup) in straw and seed and apparent N recovery (ANR) as a function of several N rates applied as pre-plant (pp), top-dress (td) and total N (tl)

N applied [pp:td (tl)] kg/ha	DM straw Mg/ha	DM seed kg/ha	NUp straw kg/ha	NUp seed kg/ha	NUp total kg/ha	ANR %
0:0 (0)	7.2 c	2059 c	5.7 c	40.5 d	46.2 d	---
0:50 (50)	10.1 b	2931 b	7.9 b	66.0 c	73.9 c	55.3
0:100 (100)	11.1 b	2868 b	14.8 a	74.5 b	89.3 b	43.1
0:150 (150)	12.5 a	4534 a	15.0 a	113.7 a	128.7 a	55.0
25:25 (50)	8.1 b	1744 c	7.3 b	42.2 c	49.5 c	6.5
25:75 (100)	9.1 b	3425 b	8.7 b	82.0 b	90.7 b	44.5
25:125 (150)	11.6 a	4026 a	33.5 a	103.0 a	136.5 a	60.2
50:0 (50)	7.3 c	2064 b	4.1c	45.8 b	49.9 c	7.4
50:50 (100)	9.1 b	1883 b	13.2 b	48.3 b	61.5 b	15.2
50:100 (150)	12.5 a	4278 a	27.4 a	117.9 a	145.3 a	66.1

¹Mean separation within columns of each pre-plant group of treatments by Tukey's test, $P < 0.05$.

4. Conclusions. Top-dress N fertilisation was more effective in promoting seed yield. Applying N after the winter rains (as top-dress) was also a better environmentally sound fertilisation strategy.

5. References.

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- [2] M.E. Lourenço and P.M. Palma. "A cultura da colza: aspectos da técnica cultural" Univ. Évora, 2006.
- [3] J.S. Schepers and W.R. Rawn (eds.), "Nitrogen in Agricultural Systems", Madison, Wis, USA, 2008.