

Growth, Yield and Relationship of Rapeseed (*Brassica napus* L.) under Different Row Spacing

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ABSTRACT

The field experiment was conducted at Sindh Agriculture University Tando Jam, Pakistan to determine the effect of row spacing on growth, yield and oil content of the rapeseed (*Brassica napus* L.). The homogeneous seed of P-53 rapeseed variety was given three row spacing viz. 30, 45 and 60 cm. The study envisaged that days to maturity, plant height, branches, pods, seed weight plant⁻¹, seed index, seed yield and oil content were affected significantly by row spacing. Among all, 60 cm row spacing proved to be best and is recommended for maximum seed and oil production.

Key Words: Rapeseed; Row spacing; Growth; Yield; Oil content

INTRODUCTION

The origin of the different rapes and mustards has variously been reported in Asia, Europe and perhaps Africa. With the multiplicity of forms that are grown, it is quite probable, that there were several separate areas of origin. Rape and mustard are extensively cultivated in Asia, Japan, and West Europe. China, India and Pakistan are the largest producers of rape and mustard. They grow over 90% of the world production. Oil extracted from rape and mustard is used almost entirely for edible purposes and is the principle cooking oil in these areas of the major production. The oil content of the seed varies from 30-45% depending upon the species, the varieties and climatic conditions under which it is grown. The oil cake remaining after extraction of the oil is used as feed for cattle and for manure. In Pakistan, per unit yield obtained at present is below as compared to other rape seed growing countries like China. This might be due to lack of proper package of technology. Among various agronomic practices, proper spacing between rows with high yielding and better oil containing cultivars play vital role in getting higher seed yield and oil requirement, because different researchers has emphasized that plant spacing is responsible for better vegetative and productive phases and reported different plant and row spacing. Verma (1990) reported closer row spacing of 30 cm for better yields. Whereas, Sierts and Geister (1987) suggested that plant density affects the plant population, number of pods plant⁻¹, number of seeds plant⁻¹ and hence seed yield plant⁻¹. Keeping above facts in view, an experiment was conducted to determine the effect of different row spacing on growth, yield parameters and oil content of the seed of *Brassica napus* L.

MATERIALS AND METHODS

The replicated field experiment was set in RCBD at Sindh Agriculture University Tando Jam, Pakistan. The P-53 rapeseed variety was given three row spacing i.e. 30, 45, and 60 cm. The fertilizer dose of 125-75 kg NP.ha⁻¹ was applied in the form of Urea and Single Super Phosphate. The full dose of P with 1/3 of N was applied at the time of seed bed preparation, while remaining dose of N was splitted in three equal parts and top dressed at the time of first irrigation, flowering and pod initiation, respectively. All the required operations throughout the growing period were adopted equally in all the plots.

RESULTS AND DISCUSSION

Experimental results for crop physiological maturity days exhibited an increase in rows upto 30 cm correspondingly prolonged maturity days followed by optimum 45 cm and wider rows 60 cm spacing. These results demonstrated that plants receiving narrow row spacing increased vegetative growth. Due to shade and competition for nutrients and moisture the crop matured later by increasing development phases. These results are supported by Kang *et al.* (1988).

Taller plants were observed in the plots where crop was planted in rows of 60 cm apart followed by 45 cm and 30 cm row spacing. This may be due to sufficient space resulted plants grow well and showed greater height. The number of branches, pods, seeds pod⁻¹, seed weight, seed index, seed yield and oil content were also found to be higher when crop planted at row distance of 60 cm (Table I). These results are supported by Gupta (1988) for plant

Table I. Relationship of row spacing with Rapeseed (*Brassica napus* L) growth, yield, and oil content parameters

Row Spacing (cm)	Maturity Days	Plant height (m)	Branches Plant ⁻¹	Pods Plant ⁻¹	Seeds Pod ⁻¹	Seed weight plant ⁻¹	Seed index (%)	Seed yield (kg ha ⁻¹)	Oil content
30	114.00	138.50	9.39	210.18	5.90	31.42	25.95	1016.48	36.86
45	112.40	140.70	10.15	239.50	6.34	32.32	27.45	1089.45	37.90
60	105.35	150.00	13.50	287.50	7.30	34.41	30.00	830.80	39.95
Mean	119.92	143.73	11.10	245.73	6.51	32.71	27.80	1120.20	38.24
Correlation Coefficient (r)	0.99	0.998	0.979	0.996	0.956	0.962	0.989	0.987	0.994
Coefficient of Determination (R ²)	0.998	0.997	0.959	0.991	0.915	0.925	0.979	0.974	0.988
Regression (byx) Coefficient	0.544	0.445	0.117	1.965	0.040	0.145	0.152	10.328	0.086

height, number of branches plant⁻¹ and seed index; Chaudhry and Mankar (1991) for number of pods plant⁻¹; Kang *et al.* (1988) for number of seeds pod⁻¹ and seed weight plant⁻¹; Singh *et al.* (1990); and Kler *et al.* (1990) for seed yield.

Relationship of row spacing with crop parameters. The positive significant correlation between row spacing and maturity ($r=0.99$), plant height ($r=0.998$), branches plant⁻¹ ($r=0.979$), pods plant⁻¹ ($r=0.996$), seeds pod⁻¹ ($r=0.956$), seed weight plant⁻¹ ($r=0.962$), seed index ($r=0.989$), seed yield ($r=0.987$) and oil content ($r=0.994$) was observed. The coefficient of determination indicated that 99% variation in maturity days and pods plant⁻¹, 99.7% in plant height, 95.9% in branches plant⁻¹, 91.5% in seeds pod⁻¹, 92.5% in seed weight plant⁻¹, 97.9% in seed index, 97.4% in seed yield ha⁻¹ and 98.8% in oil content were accounted due to the variation in row spacing. The regression coefficient indicated that for each increase in row spacing resulted in increased crop maturity by 0.54 days, plant height by 0.44 cm, branches would increase by 0.11, pods plant⁻¹ by 1.96, seed pod⁻¹ by 0.04, seed weight plant⁻¹ by 0.45 g, seed index by 0.152 g, oil content by 0.08% and increase in seed yield by 10.32 kg ha⁻¹ (Table I). On the basis of experimental results, it may be concluded that 60 cm row spacing proved beneficial in terms of seed yield and its attributes as well as oil content. Thus, it is suggested that wider row spacing of 60 cm is better for achieving maximum brassica seed yield and oil content.

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