

파종시기가 캐놀라의 耐凍性 및 耐寒性에 미치는 효과

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Effect of Planting Date on Freezing Tolerance and Winter Survival of Canola (*Brassica napus* L.)

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Objectives :

1) To find out the effect of planting date on the development of freezing tolerance and eventually, on winter survival of canola 2) and to find out the correlation between the freezing tolerance and winter survival.

Materials and Methods :

Six winter cultivars having different ranges of winter survival in previous study were planted at field on three planting dates (Aug. 25, Sept. 10, and Sept. 25). Leaf freezing tolerance by electroleakage test was measured every 15 days after planting until end of November. Winter survival was measured by counting the live plants in the fall and again in the spring of next year. The correlation was estimated between the freezing tolerance and the winter survival.

Results and Discussions

1) At all three planting dates, a phase occurred when a rapid increase in freezing tolerance occurred regardless of plant ages. This period of rapid increase in freezing tolerance was coincidental with the decreases of air temperature in the earlier fall (Fig.1, 2, and 3)

2) Planting date was the most important factor determining the freezing tolerance and winter survival (Fig. 4 and Table 1). Although both cultivar and planting date significantly affected freezing tolerance and winter survival, the effect of planting date was greater than that of cultivars.

3) A significant correlation was observed between freezing tolerance and winter survival of cultivars in these studies (Table 2). This suggested that the freezing tolerance measured by electroleakage test can be used for the screening of winter hardy cultivars of canola.

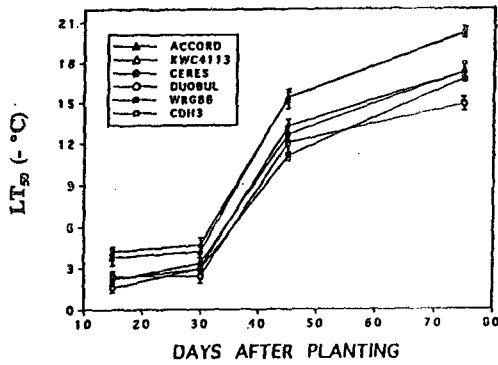


Figure 1. Changes in freezing tolerance of six winter canola cultivars planted Aug. 25, 1993. Freezing tests were conducted at 15, 30, 45, and 75 days after planting. Bar indicates mean \pm SE.

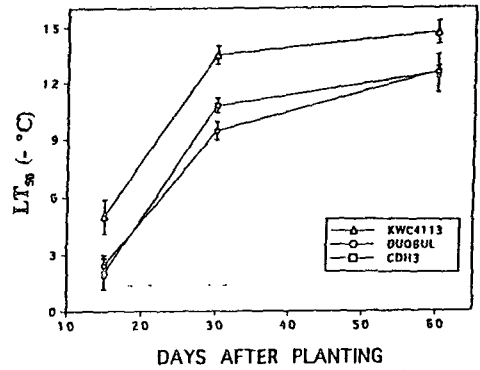


Figure 2. Changes in freezing tolerance of three winter canola cultivars planted Sept. 10, 1993. Freezing tests were conducted at 15, 30, and 60 days after planting. Bar indicates mean \pm SE.

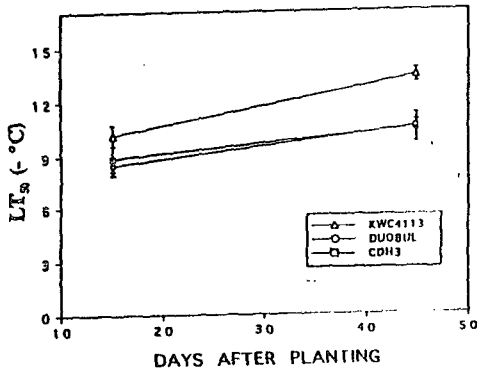


Figure 3. Changes in freezing tolerance of three winter canola cultivars planted Sept. 25, 1993. Freezing tests were conducted at 15 and 45 days after planting. Bar indicates \pm SE.

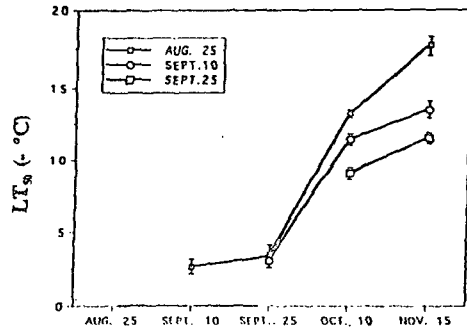


Figure 4. Changes in freezing tolerance of winter canola affected by different planting dates. Data represent overall means of six cultivars planted Aug. 25, and overall means of three cultivars planted Sept. 10 and Sept. 25. Freezing tests were performed at every 15-day or 30-day interval, depending on planting date. Vertical bar indicates mean \pm SE.

Table 1. Winter survival of six winter canola cultivars, planted Aug. 25, Sept. 10, and Sept. 25, 1993.

Cultivars	Planting date		
	Aug. 25	Sept. 10	Sept. 25
	--winter survival (%)--		
ACCORD	100.0a	72.0a	40.0a
KWC4113	100.0a	70.0a	20.0a
CERES	84.0b	59.0b	6.0b
DUOBUL	93.0b	65.0b	0.0c
WRG86	79.0bc	57.0b	0.0c
CDH3	66.0c	41.0c	0.0c

Means followed by the same letter within a column are not significantly different at the 0.05 probability level.

Table 2. Simple correlation coefficients between freezing tolerance and winter survival of canola cultivars planted Aug. 25, Sept. 10, and Sept. 25, 1993.

Planting Date	Sampling Date	r
Aug. 25	Sept. 10	0.54no
	Sept. 25	0.99*
	Oct. 10	0.85*
Sept. 10	Nov. 15	0.94**
	Sept. 25	0.00*
	Oct. 10	0.96**
Sept. 25	Nov. 15	0.83*
	Oct. 10	0.07*
	Nov. 15	0.93**

(*) and (**) simple correlation coefficient significant at 0.05 and 0.01 probability levels, respectively. (no) not significant at the 0.05 probability level.