

圃場狀態에서의 저온반응성 유전자, BN28과 BN115의 發現

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Responses of Two Cold-Regulated Genes, BN28 and BN115, in Field-Grown
Canola (*Brassica napus* L.)

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Objectives :

To study the responses of two cold-regulated genes, BN28 and BN115, isolated from *B. napus* under field conditions at different planting dates.

Materials and Methods :

Six or three winter canola cultivars were planted at three different planting date on the field. Northern blot analysis with the cDNA probes of BN28 and BN115 were done with the plant leaf samples collected every 15 or 30 days after planting. The transcript amount was quantified by Betagen Blot Analyzed and the correlation between the transcript amount and freezing tolerance was estimated.

Results and Discussions :

1) Both the genes were turned on within 15 days of planting under field condition, well before the onsets of freezing tolerance, and maintained their expression during the fall (Fig. 1, Table 1 and Table 2).

2) The expression patterns of these two genes was different suggesting that they are regulated differently (Fig. 2).

3) Though there is no correlation between freezing tolerance and expression of the genes at the cultivar levels at specific time of sampling, these genes are turned on in response to cold temperature under field conditions and that the time-course increases in BN28 expression is coincident with increase in freezing tolerance (Fig. 3 and Table 3) suggests specific roles of these genes in freezing tolerance.

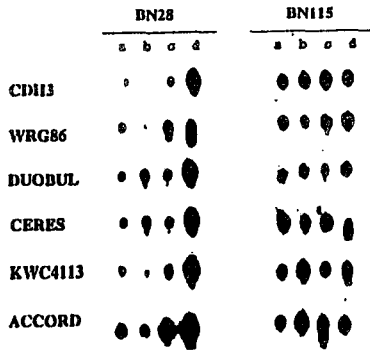


Figure 1. Northern blot analysis of six winter canola cultivars planted Aug. 25, 1993 in the field. Total RNA were isolated Sept. 10 (lane a), Sept. 25 (lane b), Oct. 10 (lane c), and Nov. 13 (lane d). The membrane was hybridized with BN28 and BN115.

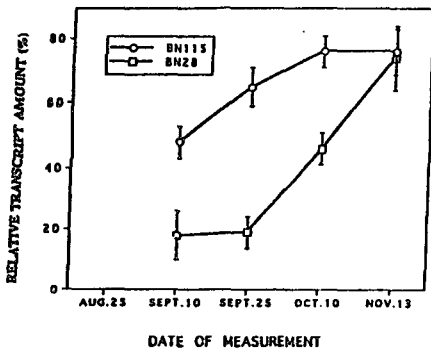


Figure 2. Time-course changes in transcript amount of BN28 and BN115 in canola planted Aug. 25, 1993. The data represent the overall mean of six cultivars and is a graphical representation of Fig. 6. Vertical bar indicates \pm SE.

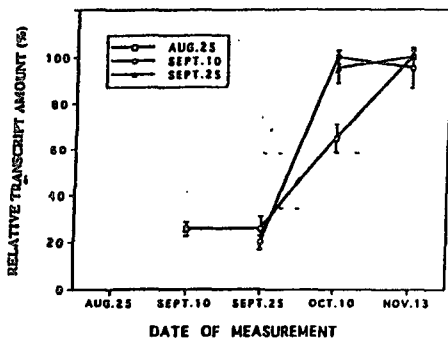


Figure 3. Changes in transcript amount of BN28 affected by different planting dates. Data represent overall means of three cultivars and a graphical presentation of the northern blot in Fig. 6. Vertical bar indicates mean \pm SE.

Table 1. Changes in transcript amount of BN28 in 6 winter canola cultivars planted Aug. 25, 1993. Data are numerical presentation of Northern blot in Fig. 6.

Cultivars	Relative transcript amount (%)			
	Sept. 10	Sept. 25	Oct. 10	Nov. 13
ACCORD	37af	20ab	60c	100c
KWC4113	19a	16b	62ab	100c
CERES	20a	13b	37b	66c
DUOBUL	10a	18b	33b	02b
WRG86	10a	13b	35b	70c
CDH13	13a	31a	20c	00bc

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

Table 2. Changes in transcript amount of BN115 in 6 winter canola cultivars planted Aug. 25, 1993. Data are numerical presentation of Northern blot in Fig. 6.

Cultivars	Relative transcript amount (%)			
	Sept. 10	Sept. 25	Oct. 10	Nov. 13
ACCORD	43b†	58b	58bc	50bc
KWC4113	46b	35c	47c	55b
CERES	35b	44c	46c	46c
DUOBUL	57a	100a	100a	70ab
WRG86	49a	95c	95c	100b
CDH13	60a	56ab	73ab	73ab

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

Table 3. Simple correlation coefficients† between transcript amount of BN28 and BN115 and freezing tolerance of canola cultivars planted Aug. 25, Sept. 10, and Sept. 25, 1993.

Planting Date	r	
	BN 28	BN 115
Aug. 25	0.59no†	-0.37no
Sept. 10	0.47no	-0.33no
Sept. 25	0.00no	-0.40no

† Correlation coefficient was estimated between transcript amount at Nov. 13 and freezing tolerance at Nov. 13.

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