#096

Exploring the introduction and adaptability of winter rapeseed (*Brassica napus* L) in northern China

***Wangcang Sun*[1]**

Junyan Wu[1]
Gang Yang[1]
Yan Zhang[2]
Aiguo Li[3]
Yali Fu[4]
Jiming Li
Yahong Zhang[2]
Li Ma[1]
Lili Li[5]
Qixian Chen[6]
Jianming Lei[2]
Lijun Liu[1]
Yuanyuan Pu[1]
Lei Zhen[7]
Juanjuan Shi[8]
Xuecai Li[1]

[1] Gansu Agricultural University, Lanzhou, China

[2] Tianshui Institute of Agricultural Sciences, Tianshui, China

[3] Hebei Academy of Agriculture and Forestry Sciences, Hengshui, China

[4] Shijiazhuang Academy of Agricultural Science, Shijiazhuang, China

[5] Pingliang Academy of Agricultural Science, Pingliang, China

[6] Gansu General Station of Agro-technology Extension, Lanzhou, China

[7] Chengxian Agro-technology Extension Center, Chengxian, China

[8] Qinzhou Agro-technology Extension Center, Tianshui, China

Background:

In northern China, vast expanses of farmland remain unused during winter, and historically, Brassica napus could not safely overwinter in past years.

Objective:

This study aims to investigate the adaptability and potential for introducing winter rapeseed (Brassica napus L) cultivars in areas north of 35°N in China, providing technical support for the development of the oil crop industry in northern China.

Methods:

A total of 56 winter rapeseed cultivars with varying degrees of cold resistance, including Longyou 88, were used to analyse and evaluate the adaptability and development potential of winter rapeseed in areas north of 35°N in China. The analysis was based on overwintering rates, growth period, yield, oil content, and agronomic traits at 46 locations in Qingyang, Pingliang, Baoding, Shijiazhuang, and other areas.

Results:

Twelve-year experimental data from 2010 to 2022 revealed that winter rapeseed could generally survive the winter, with overwintering rates above 90% and a guaranteed overwintering rate of 100% south of Tianshui. However, in areas north of Tianshui, south of Pingliang, and Shijiazhuang, only cultivars with strong cold resistance could be ensured to overwinter, with overwintering rates ranging from 74.9% to 100% and guaranteed overwintering rates between 46.47% and 100%. Among the 46 tested cultivars, five demonstrated overwintering rates above 70%, including 2018GL-Gau-24, 2018GL-Gau-30, 2018GL-GAU-39, 16Gus-1, and 16NTs309. The growth period of the tested cultivars ranged from 248 to 290 days, with significant differences observed among locations. The growth period of winter rapeseed was approximately 250 days in Shijiazhuang and Hengshui and shortened progressively from north to south in Gansu province. Growth periods in Qingyang Xifeng, Pingliang, Tianshui, and Chengxian were 290, 286, 260, and 250 days, respectively. Yields ranged from 2597.7 kg/ha to 3273.6 kg/ha. Significant variation in agronomic traits were observed among tested cultivars, including plant height and branching positions decreasing from south to north, secondary branches increasing, and the number of pods per plant decreasing. Additionally, the number of pods and thousand-grain weight increased, while oil content decreased from south to north. Correlation analysis revealed significant negative correlations between overwintering rate, yield, plant height, branch position, main inflorescence length, oil content, and glucosinolate content with altitude and latitude, while significant positive correlations were found with annual average temperature, annual precipitation, frost-free days, and coldest month temperature. Growth period and secondary branching changes showed opposite trends.

Conclusions:

Winter rapeseed cultivars with strong cold resistance can safely overwinter in areas of 38°N in northern China and below 100 meters, as well as in areas of 35°N in Gansu and below 1300 meters. These cultivars exhibit excellent agronomic traits, high yield, and oil content, allowing the winter rapeseed planting area to expand northward by 4-6 latitudes. This demonstrates substantial yield-increasing potential and is of great significance for promoting oil crop production in China.