A synthesis-analysis of winter oilseed rape (Brassica napus L.) yield response to planting density under intensive cropping system

Rihuan Cong, Zhi Zhang, and Jianwei Lu
Huazhong Agricultural University, College of Resources and Environment, China (congrihuan@163.com)

**Background:** Optimal yield is dependent on the collocations between plant population and individual growth. High plant populations for direct sown winter oilseed rape would be a prevailing way to achieve high yield under intensive cropping systems.

**Results:** We investigated the oilseed rape yield response to planting density while considering the productivity environment, nitrogen (N) fertilizer, and sowing date. A synthesis-analysis was conducted by collecting the density-yield data in the field experiments of oilseed rape from 2000 to 2016 in China. The population yield response to different planting density levels could be described by a quadratic model, with threshold value of 45-60 plant m\(^{-2}\), and excessive density may cause yield loss as the weak individual growth. High planting density has no remarkable influence on the attainable population yield due to the decreasing individual potential yield. The population yield increment capacity by the increasing planting density was higher in medium yield environment (i.e., average yield at 1500-2500 kg ha\(^{-1}\)). The planting density presented remarkably effect on population yield after the N limitation was relieved. Increasing planting density at 10\(^4\) plants per hectare was equivalent to apply 1.17 kg N fertilizer on population yield, ranging from 0.42 kg to 4.76 kg under different yield environment levels. Yield loss caused by unsuitable sowing date (especially for the late sowing) could be compensated by increasing planting density.

**Conclusion:** Planting density played a crucial role in cooperating the other management practices. Optimizing the allocation of plant population and individual growth, establishing target plant phenotype under high planting density would help to achieve high population yield.