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Strategies to optimize N fertilization of winter oilseed rape

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Optimized nitrogen (N) fertilization should enable high yields while minimizing environmental impacts. Because actual fertilizer N use efficiency of winter oilseed rape (WOSR) is poor compared to cereals, approaches which allow to reduce N input without severe yield penalties are urgently needed. An additional N supply in autumn often increases seed yield, especially if using minimum tillage or delaying sowing; however, most of the applied N remains in the system boosting the risk of N losses. A series of field trials (28 year x site combinations) revealed that the N amount taken up by the crop during autumn growth should be taken into account, when calculating N fertilization in spring. The distribution pattern in spring seems to be less relevant; thus, N fertilizer amount should be equally applied at the beginning of spring growth and at stem elongation. Late N supply applied at flowering or later in the season clearly decreases oil content and should be avoided. For N management of WOSR, crop rotation effects should be considered. Growing grain legumes before WOSR is beneficial as WOSR itself can take up large N amounts before winter and keep it from being lost. Additionally, optimum N rates for WOSR become lower. But WOSR induces beneficial effects on subsequent crops. In a 6-yr field trial, winter wheat as subsequent crop realized an yield increase of about 10% compared to wheat following wheat, although the N amount required for optimum yield was 55 kg N/ha lower (170 vs. 225 kg N/ha). However, winter wheat can only partly utilize the N being available after WOSR harvest. Probably, the introduction of a catch crop should be considered in order to maximize the N transfer into the subsequent crop.