

## **Maintaining constant tiller and spike fertility to achieve stable grain yield of *Thinopyrum intermedium*.**

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Proposed as dual-use crop for both forage and grain, *Thinopyrum intermedium* subsp. *intermedium* (Host) Barkworth & D.R. Dewey could be of major interest for crop diversification and environmental improvement of the highly productive agroecosystems in Belgium. Being in the nascent stage of domestication, its yield potential is still low compared to annual cereals. The understanding of grain yield elaboration of *Th. intermedium* in field is limited as well as its response to agronomic management. To identify the interrelations between development traits and their influence on grain yield, various crop measurements were assessed during 4 growing seasons in field grown *Th. intermedium* conducted under various nitrogen (N) fertilizations. Under N sufficient treatment, grain yield remained constant over the four years of the experiment with a mean of 1t ha<sup>-1</sup> resulting from a constant spike fertility and a spike density level above 400spikes m<sup>-2</sup>. However, inhibition of reproductive growth of tillers can occur when tiller density is too high or resources too scarce. In addition, overproduction of aboveground biomass at the beginning of the reproductive phase (i.e., up to 2.7t of DM ha<sup>-1</sup> and 1600tillers m<sup>-2</sup>) can be detrimental to the final grain yield through the negative influence of tiller density and aboveground biomass on the yield per spike. The fertilization of 100kg ha<sup>-1</sup> splitted between autumn and tillering stage could be a good compromise to sustain tiller fertility without hampering grain production. Therefore, under fertile soil conditions combined with good stand establishment, early induced reproductive tillers and optimal spike density, we demonstrated that grain yield can be maintained through crop ageing. In the future, breeding should enable a greater allocation of resources to the grains and rationalizing the production of vegetative tillers through tillering or rhizome propagation without compromising the vigor of regrowth and environmental performances.