

Possibilities to improve yield of green manured spring barley crop by delayed sowing in organic production

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In the northern growing conditions, with increasing daylengths (16-24 h) and temperatures in the beginning of the growing season, the spring barley crop rapidly develops from the vegetative to the generative stage. The speed sets high requirements for the availability of soil nitrogen, which influences tiller formation and survival, ear density and spikelet formation. In the organic production the nitrogen requirement of the tillers at this time is difficult to meet. Better utilizers of soil mineralisable nitrogen are crops with longer growing period such as oats. Due to the lower yields in barley cultivation than with any other cereals, barley is not a competitive crop in the organic rotation.

During 2000-2002 field trials were carried out at two locations (Juva (61°55'N) and Ruukki (65°40'N) to investigate the effect of delayed sowing on green manured barley crop. The delay in sowing could allow better nitrogen supply during the growing period as the soil is warmer and the build-up of mineral nitrogen from the soil organic nitrogen pool is higher. A drawback in delayed sowing is known to be the weaker and uneven tillering and the susceptibility to several leaf area defecting diseases.

Three sowing dates, occurring 7-10 days apart, were used, the last date being between 5. - 7. June. A typical seeding rate of 500 viable seeds m⁻² was used. In Juva, we additionally increased the seeding rate to 600 viable seeds m⁻² at the two latter sowings. In Juva delayed sowing weakened the tillering of Filippa, the cultivar used in year 2000, but strengthened the tillering of Saana, cultivated the last two years. In 2002 improved tillering was also observed in Ruukki (cultivar Artturi) in the 7 days delay.

The latest sown crops developed very fast to the milk maturity stage, but the crops sown at the normal date and ten days after required almost the same growing time to reach maturity. Delayed sowing increased the grain protein content, except in Ruukki in 2002, but decreased the grain yields due to slightly lower grain weights. The hectolitreweight, which is the most important quality parameter in barley, declined in Ruukki, but remained quite constant in Juva. Increasing the seeding rate of cv. Saana had small but variable effect on the grain and protein yield.

In Juva the leaf chlorophyll contents, which indicates N uptake of plants, tended to be higher with the later sown crops compared to the earliest sowing, especially in the beginning of the season. No such phenomena was observed in Ruukki. Only in 2002 the one week delay showed better leaf chlorophyll content, but at the late season after anthesis. All the crops were more or less infected by leaf diseases each summer, although the seeds were treated with Cedomon[®], a biological seed dressing. As the leaf diseases infected the later sown crops at the earlier stages, their grain filling period was shortened, resulting in lighter grains and smaller total grain yields.

In this study we conclude that no more than a week or ten days delay from the earliest suitable sowing date can be recommended, if the soil class and moisture conditions are not determining the date. Green manure is not the best nitrogen fertilizer for the barley. If possible, slurry, cattle manure or compost, containing more plant available nitrogen, should be used in organic production. Otherwise it is necessary for the future of organic cereal production that new methods to control the leaf diseases are to be developed.