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Optimal placering av pelleterad organisk gödsel

Optimal placement of pelleted organic fertilizers

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Foto: Sofia Delin

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Abstract

New technology makes it possible to apply organic fertilizers with higher precision, and organic producers want to know how to exploit these new possibilities to make their production more efficient. This study investigated the effects of different placement of pelleted organic fertilizers 1) in spring oats (*Avena sativa* L.) and 2) in the winter crops winter oilseed rape (*Brassica napus L.)* and winter wheat (*Triticum aestivum* L.). In oats, the effects on grain yield and weed density of band application in different positions of pelleted organic fertilizer were compared with broadcasting. Six microplot field experiments were carried out on silty clay and sandy loam in Sweden during the growing season of 2014-2016. In oats seeded at 25 cm row spacing, pelleted meat bone meal was band-applied at one of three distances from the crop row (0, 4, and 12.5 cm) and at one of two or three incorporation depths (1 and 4 cm on silty clay and 1, 4, and 6 cm on sandy loam). These treatments were compared with broadcast spreading, mineral nitrogen fertilizer, and an unfertilized control. On both soil types, fertilizer placement 4 cm from the crop and 4-6 cm incorporation depth gave the highest yield and crop nitrogen uptake. Yield in this treatment was 800 kg ha^{-1} higher on clay soil and 1100 kg ha^{-1} higher on sandy loam compared with the same organic fertilizer applied by broadcasting, which is an 80-150% higher yield effect. On the sandy loam, distance from the crop row had a more significant effect on grain yield ($p<0.001$) than soil incorporation depth ($p=0.07$). On the silty clay, crop yield was significantly influenced by incorporation depth ($p=0.003$) and distance from the crop row ($p=0.04$). In five experiments, mineral N fertilizer equivalent (MFE) increased from on average of 63% with broadcasting to 85% with placement 4 cm from the crop row and 4 cm incorporation depth. Weed biomass was significantly affected by fertilizer placement on the clay soil, with higher weed biomass with deeper incorporation ($p=0.045$) and greater distance from the crop row ($p=0.049$). On the sandy loam, there was a tendency for larger weed plants at greater distance from the crop row ($p=0.13$) except when seeds and pellets were placed together, which gave the highest weed weight, probably due to lower competition from the crop in this treatment.

Three experiments were carried out in a hybrid winter oilseed rape seeded by hand at 25 cm row spacing, on two loam soils and one clay soil in Sweden during the growing seasons of 2014/2015 and 2016/2017. Eight treatments involved band application of 80 kg total-N ha^{-1} as MBM at 2 and 5 cm soil depths between the crop rows in spring and at sowing band application at 5 cm depth between and under the rows. The treatments were compared to surface broadcasting in spring and at sowing, mineral N fertiliser (80 kg N ha^{-1}) in spring and an unfertilised control. MBM placed in bands at 2 and 5 cm in spring led to 380 kg ha^{-1} (n.s) and 770 kg ha^{-1} ($p= 0.07$) higher grain yield respectively compared with broadcasting, meaning up to 29 % better yield effect from incorporation in bands compared to surface broadcasting. At sowing, incorporation to 5 cm depth between or under rows had a similar effect on yield as broadcasting. Broadcasting at sowing tended to give a higher yield than broadcasting in spring.

In one experiment with winter wheat band application with three incorporation depths (1, 3 and 5 cm) was compared with broadcasting at fertilization in early spring (March) or spring (April). In an additional treatment 25% of the MBM pellets was applied at sowing. There were no significant differences between the different application strategies of MBM pellets, but a tendency for higher yield with incorporation at 3-5 cm depth rather than 0-1 cm incorporation depth.