

## CATCH CROPS AND COVER CROPS

2011

authors: G.H.Rubæk and U. Jørgensen

### *Description*

Catch crops or cover crops are grown in the period between two main crops in order to retain nutrients in the root zone (catch crops) or to protect the soil against erosion and minimise the risk of surface runoff by improving the infiltration (cover crops). Catch and cover crops can be under sown the previous main crop or sown immediately after harvest of previous the main crop. Catch and cover crops are mainly used prior to spring sown crops, but the use of a fast growing catch crop before winter crops is presently being investigated (ref??). Crops grown in between two main crops may serve mainly as either catch or as cover crop or both. Termination of catch and cover crops can be done by mowing, tillage, roller chopping, application of herbicides or relying on temperature extremes.

### *Rationale, mechanisms of action*

#### Catch crops:

Well established non-leguminous catch crops grown after harvest of agricultural crops can reduce nitrate leaching from the root zone in areas characterised by excess precipitation and runoff during autumn, winter and early spring. The rationale is, that the catch crop immobilises available nitrogen remaining in the soil after the harvest of the main crop by taking it up and storing it in the catch crop tissue. The immobilised N will be released to the soil again, when the growth of the catch crop is terminated e.g. by tillage the following spring. Effectiveness of a catch crop depends on fast establishment, the time chosen for termination of the catch crop and crop specific properties like growth rate, rooting depth and root density. By choosing crops capable of fast establishment and with deep rooting systems the efficiency can be improved (Thorup-Kristensen 2004). It is also possible to optimise the effectiveness of catch crops by using them systematically after crops known to leave substantial amounts on nitrate or organic N, which is easily mineralised e.g. the two first years after a grass or clover-grass fields or on fields receiving animal manure wherefrom organic N is steadily released for months after the manure was applied. Catch crops are mainly introduced to retain N, but catch crops do also retain and recycle available P in the root zone.

#### Cover crops

Cover crops are grown on soils which otherwise would be bare in the winter season in order to protect the soil surface against erosion and nutrient losses through surface runoff. Fast establishment of the crop is important. Cover crops reduce both wind and water erosion of soil particles at the same time it retains N and P in the root zone for use by the following crop. Cover crops also promote infiltration and roots enhance percolation of water into the soils, which reduce losses of nutrients through surface runoff.

### *Applicability*

Cover and catch crops are suited for use in any cropping system, where bare soil is vulnerable to nutrient leaching, erosion or surface runoff in the period between the main crops and where there is opportunity for ample development of the catch or cover crop, in this period. Use caution in situations, where the cover or catch crop vegetation could deplete soil moisture prior to seeding the succeeding main crop. Inadequate canopy cover or stem density may cause insufficient effectiveness of a cover crop.

Land for spring crops, ploughed in late autumn, has the winter for frost action and wetting and drying cycles to break down soil clods. Ploughing in the autumn also allows early establishment of the following crop as only secondary cultivations are required ahead of drilling. On medium to heavy soils, if ploughing is not carried out in late autumn, the delayed cultivations may result in the

spring crop being drilled into a drying seedbed. This may impact on the establishment and yield. Delaying cultivation until the spring may also have implications for the control of some weeds, and there are also soil structural implications associated with cultivating during a wet spring. For grassland, reseeding in spring is less reliable than in autumn.

#### *Effectiveness, including certainty*

A well established cover or catch crop can reduce nitrate leaching, and P losses soil erosion and surface runoff significantly. Certainty depends largely on the possibilities for proper establishment, proper choice of catch and cover crop type, the timing of when the catch/cover crop is terminated. Effectiveness increases considerably if the N released from the catch crop is taken into account leading to reduced N fertilisation with manure or fertiliser to the following crop.

This option requires commitment and skills from farmers and advisors to turn out successful.

#### *Time fame*

Catch and cover crops can be implemented on a short time horizon and the effect will be obtained immediately.

#### *Environmental side-effect/pollution swapping*

Reductions in nitrate leaching also leads to reductions in greenhouse gas emissions. Catch and cover crops contribute positively to storage of carbon in soils. In some cases introduction of catch and cover crops will result in increased use of pesticides (e.g. for termination of the catch/cover crop). On heavy soil there is a risk of structural damage of the soils compromising the yield and utilisation of nutrients in the following crops.

#### *Relevance, potential for targeting, administrative handling, control*

Catch and cover crops are relevant in areas with high risk of nitrate leaching, erosion or surface runoff. It can be targeted at such areas and implemented in cropping systems known to cause high rates of nitrate leaching. Control is possible by visual inspection and should take place at the field level.

#### *Costs: investment, labor*

Costs may include seed bed preparation, seed, planting and killing the vegetation. In case the catch/cover crop is harvested the costs for harvest may be counter balanced by the value of the forage. In structural damages etc. there might also be costs related to reductions in yield in the main crops.

#### *References*

- [1] Jerry Lemunyon, 2005. Cover crops. SERA-17, Description of BMPs. [http://www.sera17.ext.vt.edu/Documents/BMP\\_Cover\\_Crops.pdf](http://www.sera17.ext.vt.edu/Documents/BMP_Cover_Crops.pdf)
- [2] Schou J.S., Kronvang, B., Birr-Pedersen, K., Jensen, P.L., Rubæk, G.H. Jørgensen, U. & Jacobsen, B. 2007. Virkemidler til realisering af målene i EUs Vandrammedirektiv. Udredning for udvalg nedsat af Finansministeriet og Miljøministeriet: Langsigtet indsats for bedre vandmiljø. Faglig rapport fra DMU, nr. 625, 132 s. [http://www2.dmu.dk/Pub/FR625\\_Final.pdf](http://www2.dmu.dk/Pub/FR625_Final.pdf)
- [3] Cuttle, S., Macleod, C., Chadwick, D., Scholefield, D., Haygarth, P., Newell- Price, P., Harris, D., Shepherd, M., Chambers, B. & Humphrey, R. (2007) An Inventory of Methods to Control Diffuse Water Pollution from Agriculture (DWPA) USER MANUAL. Defra report, project ES0203, 115 pp. p. 9-10. [http://www.cost869.alterra.nl/UK\\_Manual.pdf](http://www.cost869.alterra.nl/UK_Manual.pdf)