

A VERY DIVERSE ARRAY of solutions



The presence of a permanent cover has little impact on the crop's yield if the chosen species is properly controlled and is adapted to the cropping techniques used. It slightly increases man hours. But its impact on costs and net margins is extremely variable and can go either way.

Several studies have been carried out in order to gain an overall vision of the economic impact of permanent covers. Four of them are based on trials or the combination of several trials, and two others on farms monitored as part of the PERMAC project(1). In each case, technical, economic and environmental indicators were calculated using the Systerre software, with data from two identical farms, using their machinery, their own rotation, and systems involving or not involving permanent covers. Weed control programmes and mechanical cultural operations were designed to meet cover management objectives (controlling or destroying a particular species). Different cover species were used depending on the situation. They were either destroyed in wheat, or kept alive.

In the first three cases outlined in the table, the cover is established at the same time as oilseed rape, which is followed by wheat: two trials, one in Boigneville (near Paris) and the other in Dosnon(2) (northern central France), and one simulation based on several trials' combined data (3). A second simulation was based on a trial carried out at La Jaillière (western France), where a

cover consisting of annual clover was sown in a crop of forage maize and kept until stem extension of the following wheat.

The first farm monitored as part of the PERMAC project is Bernard Destouches's (western central France), where two wheat crops follow lucerne utilised primarily as a seed crop. The second farm is the St Armel GAEC (western France), where white clover sown with an oat catch crop, was kept alive under forage maize in 2015, then under wheat in 2016.

Hardly affected yields and an often reduced TFI

As for costs, on the whole covers make very little difference and no definite trend can be identified. Nitrogen inputs remained the same for the Boigneville simulations, the Dosnon trials as well as at La Jaillière, but the farmers monitored as part of the PERMAC project slightly reduced their nitrogen application rates (between 0 and 25kg N/ha).

It is often feared that permanent covers will increase the use of herbicide to control or destroy them. This is sometimes the case, as it was in Dosnon, where the birdsfoot trefoil required an additional application of synthetic hormone, because the use of Atlantis as a weed control method at the end of winter does not destroy or properly control this legume. On Bernard Destouches's farm (see zoom), the rate of glyphosate applied had to be increased when establishing wheat in order to control a long established lucerne. But in several other cases, the use of herbicides tended to be reduced.

« 40 to 120€/ha added to the net margin when the permanent white clover cover is destroyed in the wheat, or kept alive but properly controlled. »

In wheat, the control or destruction of a permanent cover sometimes requires higher rates of herbicide, but this is often offset by a reduction in the amount of herbicide applied between crops in order to keep the cover alive (it is shredded after harvest rather than chemically destroyed; reduced glyphosate application rate before sowing wheat in one year old covers). In some cases in oilseed rape, the use of herbicide is also reduced in order to keep the cover alive.

« Managing a cover and keeping it alive is a highly technical task. It is therefore safer to destroy a cover under wheat at the end of winter. »

Permanent covers sometimes result in a slight increase in man hours and machinery costs; however, it amounts to less than 10% of the total man hours and is due to additional mechanical cultural operations (maize hoeing, or cover shredding after harvest instead of chemical destruction). In other cases, it decreases, for example because it saves sowing a new cover after harvest.

Varied impact on margins

The impact of covers on the net margin of the whole crop succession has proved extremely variable from one case

study to the next. The annual cover trial at La Jaillière showed a definite drop in margin over the overall maize-wheat succession; although the impact on yields was minimal, costs rose significantly: +100€/ha of operational costs, including that of the cover seed and the additional burden due to changes in weed control in maize (in order to make it legume-safe), and +40€/ha of mechanical costs, including the introduction of hoeing in maize.

The other cases studied fared better. Indeed, in the trials, white clover sown at the same time as oilseed rape has a positive impact on the following wheat yield trend. Inputs are virtually the same and the slightly raised cost due the price of clover seed is easily offset by savings in weed control. Machinery costs hardly increase. In the end, the combined net margins for the oilseed rape-wheat succession improves. Lucerne produces cultural results similar to those obtained with white clover, with higher seed costs and therefore slightly less worthwhile margin increases (except in the case of established lucerne, that removes the need for additional cover sowing). The results with the birdsfoot trefoil (in Dosnon) were not very positive: high seed costs, additional herbicides to control this species which is pretty resistant to sulfonylurea, and slight decrease in wheat yield.

Based on three trials carried out in the Midi-Pyrénées region using similar cultural systems (red clover sown under oilseed rape and destroyed under wheat), Agro d'Oc calculated an average net margin increase of 120€/ha, over both crops.

The simulations carried out at Boigneville show that, if the cover is not properly controlled (hypothesis of 35% yield penalty, based on average of three trials), the margin losses are spectacularly high: -400€/ha on average over the two crops (oilseed rape followed by wheat). Managing a cover while keeping it alive is a highly technical task, and the cost of any mistake will clearly be high. It is therefore safer to destroy a cover under wheat at the end of winter. The utilisation of the cover as forage has not been included in those calculations, but this possibility deserves to be taken into account in the case of a mixed farming system.

(1) The PERMAC project is led by ARVALIS, in partnership with the Terrena cooperative and with the support of the Pays de Loire Regional Council.

(2) Trial carried out by ARVALIS, in partnership with CETA in Romilly.

(3) Combination of trials carried out by Terres Inovia, ARVALIS, GRCETA (Aube), VIVESCIA and CETA (Romilly-sur-Seine) on oilseed rape, and by ARVALIS on wheat.

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ZOOM

A LUCERNE STAND: a tried and tested strategy

The cropping system with permanent lucerne cover implemented by Bernard Destouches is equally suitable for arable and mixed farms. Monitoring over two years as part of the PERMAC project ⁽¹⁾ shows that overall performance has improved.

“ SOWING UNDER LUCERNE
increases net margin “

In 1998, Bernard Destouches decided to stop ploughing the clayey-calcareous soil of his 148ha farm in central-western France in order to reduce his machinery costs and man hours. His rotation is extremely varied, with cereals, maize, oil protein crops and seed lucerne. In 2009, he extended direct drilling into a lucerne cover to the whole farm.

After growing lucerne as a main crop, the following crop is established by direct drilling into the controlled lucerne cover. With a winter cereal, the cover grows very little and does not penalise the crop. The spontaneous reappearance of lucerne after harvest is more guaranteed than the emergence of an annual cover, and can be repeated over at least three seasons.

A permanent cover that fits in well with wheat

Over the two years of monitoring, wheat growing in this cover did not present any technical problems and gave comparable results,

both in quantitative and qualitative terms, to those of a cropping system without any cover. The advantages are primarily agronomic and economic, including, over two year, improved margins, reduced production costs and man hours, a better energy balance, less greenhouse gas emissions due to reduced machinery use (less use of machinery, and significant reduction in fuel consumption) and slight savings in nitrogen fertiliser (around 20kg per hectare the second year).

The indicators that show a poorer performance compared with a system without covers are the TFI and the quantity of active substances applied per hectare. This is because cover control requires higher glyphosate application rates when establishing the main crop.



Wheat crop established with direct drilling into a lucerne cover (left). Lucerne, if properly controlled at sowing time, remains very unobtrusive in the following wheat crop (right) and regains its strength during the intercropping season.