Grower Network Open Day 2011

WINTER OILSEED RAPE

Oilseed rape is a very important crop in arable rotations, with the potential to produce the best gross margin of any break crop. However, in spite of developments in breeding, agronomy and nutrition, many growers find it difficult to achieve consistently high yields. In order for it to be a competitive biofuel crop it is important that we maximise yields in order to maintain the crops profitability and also improve the crops carbon footprint, by producing more yield from the land currently available therefore not affecting Land Use Change (LUC).

The maximum theoretical yield for winter oilseed rape in the UK on moisture retentive soils is believed to be about 9.2t/ha, and yet across the UK average yield struggles to get much above the 3t/ha level. The biggest influence on yield is undoubtedly the weather, but even when conditions are favourable, we still struggle to hit big yields on a consistent basis. Whilst this 9.2t/ha figure is going to require big improvements in genetics, husbandry & agronomy, we know from trials that currently yields in excess of 6.5t/ha are possible. In order to achieve these high yields, it is important to maximise seed number, seed weight & minimise harvest losses. Seed number is determined by a period of approx 200 –300 day degrees Celsius (2-3 weeks) immediately after flowering. In order to maximise seed numbers it is important that the crop can photosynthesise as efficiently as possible during this period and this is most likely to occur by building a crop canopy with a Green Area Index around 3.5 at flowering. This is most likely to be achieved with a plant population in the spring of between 25 and 40 per square metre.

Too thin a canopy and there is simply not enough green area to intercept enough solar radiation for optimum seed numbers, whereas too thick a canopy can lead to too many flowers reflecting solar radiation (up to 60% losses have been recorded). Thick canopies also tend to produce too many pods which tend to produce significantly less seeds per pod and ultimately less seeds per square metre. Pods are also relatively poor at photosynthesis compared to leaves, thus thicker canopies with lots of pods are often less efficient at utilising solar radiation. Thick canopies also prevent light penetration to the lower leaves. These leaves, kept in darkness, instead of photosynthesising will actually be respiring hence wasting energy. Further down the line, thicker crops are more likely to lodge & are more susceptible to diseases; hence seed fill is likely to be reduced.
Having built the optimum canopy to produce the maximum number of seeds, it is then vital to keep the crop as green and healthy for as long as possible in order to fill the seeds. Unlike cereals, osr is relatively poor at redistributing dry matter, hence the crop needs to be actively photosynthesising as late in the season as possible in order to fill the harvestable material (the seeds).

Work at the site to date has shown that improving rooting, building optimum plant populations, keeping the crop disease free and providing sufficient nutrients are all vital if we are to achieve the above objectives and this year's work includes:

- Range of different establishment techniques from single pass to 4 pass system including:

    - Heva flat lift – banding seeds behind leg
        - (with and without seedbed nitrogen)
    - Sumo trio – banding seeds behind leg
    - Sumo trio followed by Horsch disc drill
        - (courtesy of Adamson Contractors)
    - Vaderstad top down followed by Carrier followed by Rapid disc drill
        - (with and without slurry injection prior to planting)
        - (courtesy of AWSM Farms)
    - Lemken plough, Simba Cultipress, Kuhn Power harrow combination drill

- Seed rate work from 4 seeds/m^2 up to 120 seeds/m^2:

    - Techniques for manipulating plant populations – Highlighting the need to start with the right plant population

- Evaluation of nutritional products:

    - Elemental sulphur
    - Wide range of establishment aids
    - Trace elements (Boron, Molybdenun & Manganese)
    - Late foliar potash & foliar magnesium. Very late Nitrogen – to keep crop photosynthesising for as long as possible.

- Novel concepts:

    - Application of amino acids – aiding numerous processes in plants
    - Application of natural microbial nitrogen enhancers

WINTER WHEAT

Choosing the correct variety & nitrogen strategy are the two key areas that the Grower Network is focussing upon fon for improving the production of bioethanol in the North East.

Nitrogen fertiliser strategy may be considered the most important factor in growing a biofuel crop for a range of reasons. Whilst its use increases yields substantially, it also increases grain protein content. Grain protein reduces alcohol yields per tonne of grain, reducing processing efficiency and hence profitability for the bio ethanol processor. Timings and rates of nitrogen have been studied in the region in recent years. Evidence from these studies suggests that applying up to 50% of the N earlier in the season would generally reduce grain protein content & increase alcohol yields per tonne, without negatively affecting grain yields, and perhaps in second cereal situations, increasing grain yields. Work funded by NEPIC has found that earlier than traditional nitrogen timings improved alcohol yields by around 4l/t on a consistent basis. Whilst this may appear a relatively small increase, it could potentially bring benefits in improved bio ethanol production by more than £1 million per annum. The negative effect of applying earlier nitrogen is that it increases lodging risk & because it creates a denser canopy and more humid microclimate within the crop earlier in the season, it significantly increases the disease risk.

Objectives of the 2011 trial

- Continue to apply early nitrogen to improve alcohol yields
- Continue to evaluate range of wheat varieties & triticale
- Look at varietal interactions with earlier nitrogen & also compare hard endosperm wheats against soft endosperm varieties.
- Compare new & existing fungicides on both foliar & stem based disease
- Look at how application technology can improve performance of products by improving target coverage.

Winter wheat trial 2011

Triticale

Varieties Bennetto & Grenado out-yielded all wheat varieties in the 2010 trial at the Eryholme site. This year some plots are only receiving a half nitrogen dose as previous work has suggested due to its ‘scavenging ‘ ability, triticale could produce yields similar to second wheats with a lower nitrogen input. As nitrogen accounts for about three quarters of the Greenhouse gas emissions of growing a wheat crop,

anything to reduce nitrogen applications would provide a positive environmental benefit.

Hard Wheats

Hard endosperm wheats can produce alcohol yields per tonne close to that of some of the softer wheats. This could be particularly relevant in second & continuous wheat situations where hard endosperm wheats tend to produce higher grain yields and therefore potentially more alcohol per hectare. Hard wheats have been traditionally dismissed from alcohol trials as the majority of trials have been carried out by the Scotch Whisky Research Institute (SWRI) who only screen soft wheats due to potential problems with residue viscosities of hard wheats and a limitation of enzymes available to extract the starch. On an industrial scale however extracting starch from hard wheats may be more practical and warrants further investigation. In view of this the three of the highest yielding second wheats, Grafton, JB Diego & Duxford are continuing to be evaluated at the site.

Other varieties include

Tuxedo – High yielding potential Group 3 variety with good disease resistance

Target- High yielding potential Group 3 variety which performed well here last year

Invicta- High yielding potential Group 3 variety with good disease resistance

Alchemy- Popular Group 4 soft milling feed variety with good septoria resistance

Oakley- High yielding Group 4 hard milling feed variety- very susceptible to yellow rust

Gravitas-High yielding soft wheat

Santiago- Very high yielding hard feed wheat with moderate disease resistance

Denman- Soft wheat bred for distilling & bio-ethanol market (Bred from Glasgow which had highest alcohol yield per tonne in last years trial)

Beluga - Very high yielding soft wheat with highest alcohol yields in SWRI 2010 trials.

Early conclusions & key discussions from Open Day 2011:

OSR

Importance of starting with lower seed rates – Even the 4 seeds/m^2 plots would have been acceptable to growers on the day.

Importance of seed bed fertiliser – to create 'growbag' scenario for emerging seedling

Importance of removing compaction, maintaining moisture and accurately sowing seed if low, evenly established plant populations are to be realised.

Importance of keeping crop as green and healthy for as long as possible to maximise seed fill and oil content. Late N and need to time dessication/swathing correctly highlighted. Many farmers still too early, instantly cutting off yield and oil content.

Winter Wheat

Early nitrogen applications have led to high disease pressure – particularly yellow rust & eyespot

New chemistry (SDHI & strobilurins) giving clear visible advantage in yellow rust disease control over triazole chemistry alone.

Coverage is essential to achieve best results from products – with flat fan nozzles giving a clear visible advantage in disease control over low drift nozzles.

Angling flat fan nozzles can improve disease control even more – which follows on from previous work suggesting angling flat fan nozzles alternatively forward and down can increase yields by over half a tonne a hectare in high disease situations. Bringing lateral movement to low drift nozzles by angling them forwards improves their coverage and visible disease control. This could be particularly useful during windier conditions allowing reasonable coverage without compromising timing.
The adjuvant transcend allows the coverage of a low drift nozzle to match that of a flat fan – which could be useful in bringing more spray days in to play (as potential to spray 1 beaufort scale higher with bubblejet nozzles) without compromising product performance.

All plots are fully replicated & will be taken through to yield.