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Broadacre Weed Control: Non-herbicidal strategies, Part 3, (Final)

This is the final in the series on non-herbicide weed management options by Steve Sutherland. This month, Steve discusses options for managing weeds during the cropping phase.

WEED MANAGEMENT DURING THE CROP YEAR

After a paddock has been prepared through weed management in the pasture and non-grain crop phases, a range of measures are available for the grain crop phase.

Final paddock preparation

The objective prior to sowing should be to germinate as many weed seeds as possible. There are a couple of well-recognised techniques for this including:

- **Autumn tickle.** A light soil disturbance prior to sowing time can stimulate extra weeds to germinate. If the paddock has been ploughed to bury weed seeds, make sure the tickle is not so deep that these are unearthed.
- **Delayed seeding.** This is a useful technique for slightly under-prepared paddocks and involves choosing a crop or variety suited to late-sowing. For example, Silverstar wheat is suited to late May–early June seeding compared to Osprey which is an April–early May variety. Choosing Silverstar therefore allows for between 3–6 weeks extra weed control. Field pea is another crop suited to later seeding and this can make it an ideal choice for a green manure crop.

The goal with pre-seeding operations should be to have achieved as good a weed kill as possible so that, at seeding, there few weeds left to control. Where soil moisture is high and there is a risk of weeds being transplanted, try to delay workings until the soil has dried-out. Working over-wet soil also leads to compaction so it is a good idea to follow the following farmer advice:

'A small amount of dust rising behind the cultivator or seeder is a good indication that soil moisture is about right.'



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SOWING THE GRAIN CROP

With weed kill ploughings, the seeder needs to be set-up with new points so that a full-disturbance can be achieved. This should be considered a backup to the earlier workings, rather than a main weed kill operation. This is especially the case if a shallow seeding is needed as the drill may not be deep enough to achieve a good kill of established weeds. Other points to remember at sowing time include:

- Make sure that boxes are clean and that no weeds are draped around the tynes.
- Check the seeder mechanism, making sure that all distributors are working.
- Avoid sowing more deeply than is necessary.
- Make sure there are no gaps in the crop, either between seeder runs, on headland areas, or due to blocked tubes.



Above: Bare areas in the crop allow weeds to grow unchecked.

Clean Sowing Seed

One of the most common ways of spreading weeds from paddock-to-paddock is via contaminated sowing seed. This has been the case since humans began growing crops. Producers, therefore, should:

- Select their seed area in the crop early in the season. They should spend some time roguing weeds before harvest time.
- Choose the plumpest seed from the cleanest area of the crop. Avoid areas of weeds which have difficult-to-clean seeds.

- Spend time cleaning the header and associated storage bins. Harvest clean areas before weedy areas.
- Have the seed cleaned as thoroughly as possible.
- The cleaning process can also be used to grade-off small crop seeds.
- If buying seed from another farmer, check the paddock prior to harvest or at least get a written statement as to the weed content.
- Purchase new varieties from registered growers where weed levels are closely-monitored and a statement of purity is available with each seed lot.

CROP COMPETITIVE ABILITY

In any comprehensive weed management program for cropping, competitive ability in the crop is a high priority. Competitive crops will help maintain crop yield and reduce weed dry matter and seed production. Producers should aim at rapid crop emergence and subsequent canopy closure. Factors which are manageable include:

- **Soil pH.** If it is not possible to apply lime for any reason, choose varieties such as Diamondbird wheat, which is acid tolerant.
- **Soil Fertility.** A crop sown into higher-fertility soil will establish more rapidly than one on less-fertile soil.
- **Disease.** High levels of disease inoculum will mean that crop seedlings will suffer. Paddock preparation therefore needs to include cereal disease management. Apart from yield loss due to disease, the weakened crop allows weeds to flourish.
- **Crop Species and Variety.** Choose a crop that suits the situation and, if possible, choose a variety which is more competitive. For example, crops can be roughly ranked in competitive ability from most competitive to least competitive. For example: Oat > cereal rye > triticale > canola > spring wheat > spring barley > field pea > lupin (Lemerle *et al* 1995). Within crops, there is also a wide range of competitive abilities. For example, Lemerle *et al* 1996, tested a large range of wheat varieties from Australia and overseas with Table 1 showing selected data from the paper.

Table 1. The impact of competitive ability of a range of wheat varieties on dry matter production of annual ryegrass at Wagga Wagga

Source of wheat genotype	Average dry matter production (g/m ²) of annual ryegrass
Old varieties, released before 1950	103
Cargil varieties	148
Victorian varieties	138
NSW Agriculture varieties	151
Durum varieties	259

This work emphasises the range of competitive ability in wheat. A great deal of effort is now being put into breeding more competitive varieties.

- **Seed size.** There is a direct relationship between seed size and seedling vigour. Plump seeds make stronger seedlings than do smaller seeds.
- **Sowing rate.** A wheat crop sown at 110 kg/ha will be more competitive against weeds than a crop sown at 75 kg/ha. A little care needs to be exercised here though, depending on the seed size and tillering ability of the variety. A target density of between 150–200 plants per square metre should be aimed at, depending on the rainfall.
- **Seeding depth.** Sowing deeper than is necessary leads to delays in emergence. If some rows (such as, the back ones on the combine) are shallower than others (the front rows of the combine) they will emerge at different times. The deeper ones will then be at a disadvantage against weeds.

- **Press wheels.** In certain soil conditions, press wheels can be an advantage because moist soil is pressed around the seed. The negative impact of this means that weed seeds will also respond to the pressing action. This effect can be minimised by using the narrowest wheel possible.
- **Fertiliser placement.** Fertiliser placement has a significant effect on a crop's competitive ability. See the experimental results below.

Nitrogen fertiliser placement

Recent work at Wagga Wagga has clearly shown that fertiliser placement and timing can influence how much weeds compete for nutrients. In general, if nitrogen is banded close to the crop, weeds have less impact. The very worst treatment involved broadcast prior to sowing. This caused almost three times more yield loss than when nitrogen was banded under the row. Table 2 shows selected results from this experiment.

NOTE: There is almost no difference between the yields of the weed-free treatments but a massive three-fold difference between the best and worst weedy plots. In other words, in a weedy situation, fertiliser placement is vitally important.

Phosphorus has an additional 'problem' of not being mobile in the soil. Therefore, the advantages in banding with the seed over broadcast in terms of simple yield-response in weed-free situations have been demonstrated many times. This is because this relatively-immobile nutrient is placed where the crop roots can find it readily when it is banded. In addition, it is also probable that a greater proportion of the available phosphorus is immobilised in the soil after broadcasting.

Table 2. Impact of urea fertiliser placement on yield loss from annual ryegrass in wheat (Lemerle et al un-published).

Fertiliser placement	Yield (t/ha)	Yield loss percentage
(1) Broad cast prior to sowing.	<i>weed-free</i> 6.8 + ryegrass 4.9	28
(2) Top dressed at end of tillering (Zadocs 31).	<i>weed-free</i> 6.8 + ryegrass 5.4	19
(3) Banded midway between the wheat rows at sowing.	<i>weed-free</i> 6.5 + ryegrass 5.6	14
(4) Banded under wheat row at sowing.	<i>weed-free</i> 6.8 + ryegrass 6.1	10

Consider the almost three-fold difference between treatments (1) and (4) in Table 2. There is no reason to think that this contrast would not apply to phosphorus, whatever the source. Any loss to weeds here would be on top of the immobilising problem.

IN-CROP WEED CONTROL OPTIONS

Hay cut and/or firebreak

A lot of weeds creep into paddocks from around their edge. A hay cut and subsequent fire break can, therefore, ensure weeds growing there do not spread into the paddock.

Post-sowing, pre-emergence cultivation

In some cases, especially if very narrow seeding points have been used, extra weed control can be achieved with a post-sowing, pre-emergence cultivation. Even though this is far from a new technique, recent Canadian work showed that a post-sowing, pre-emergence working with harrows or a rod weeder can achieve significant weed control after sowing with narrow points. (Johnson *et al* 2001) This was especially the case where delayed seeding was also used. Untreated plots in 1999 carried more than 150 weeds per square metre while the harrowed and rod weeded plots had about 20 per square metre in the late sown plots. The harrows used in the experiments were spring tyne, mounted harrows. Trailing harrows can also be used, as long as they do not disrupt seed placement.

Post-emergence harrowing

Harrowing after the crop is up and well-anchored (such as, the 4–5 leaf stage of cereals) can be an option for small weeds that emerge after the crop and whose root systems are still weak. The best way to assess this method is to first check the crop for root development then hook-up the harrows and do a small strip.

Roguing

Once the crop is up, checking may reveal scattered weeds that can be controlled by hand roguing. This is especially the case in areas of the crop selected for next season's seed.



Above: Post-emergent control of weeds using Hatzenbichler® harrows. Photo: T. Koenig

Slashing/mowing weedy patches

Often, weeds emerge in patches which are dense enough to swamp the crop but too extensive to rogue. In such cases, an option is to slash or mow the patches. This will prevent a huge amount of seed going back into the paddock. It will also reduce weed seed spread around the paddock at harvest time.

EXTENDING THE CROP PHASE

The option of growing consecutive crops will sometimes be possible. If this is the case, there are weed management options which can reduce the amount of seed going into the seedbank prior to, and after, harvest. There is no reason that the following techniques could not also be used for paddocks going back to pasture.

Windrowing the crop

Windrowing the crop before threshing is a useful technique if the weeds being controlled tend to shed seed before the crop is ripe. A little care is needed though, as windrowed crops can be more prone to weather damage if threshing is delayed. Windrowing puts all weeds into a confined area where there is much more chance of the header picking up the seed.

Harvesting Patterns

Weeds tend to occur in patches around paddocks. Since headers tend to spread the weed seed from patches to clean areas, it is worthwhile considering harvesting the clean areas of the paddock first. For example, many weeds tend to creep into paddocks from the edge. A simple way to prevent the header making this problem worse is to harvest this area separately. Some weeds also tend to be prevalent in corners of paddocks, especially where a sheep camp may have been. Once again, harvesting these areas separately will help prevent seed movement onto clean areas.

Collecting weed seeds with the header

There are several ways weed seeds can be collected by using a header.

- Set the machine to collect the weed and crop seed. Weed seed can then be cleaned-out later.
- Use a machine equipped with a grain cleaner such as the Hannaford screen.
- Create narrow header trails of chaff, rather than spreading the chaff. The header trails can be burned later and a good proportion of seed can be killed.
- Use a header equipped with a chaff cart in which all the chaff and weed seeds can be collected and put into heaps.

All of the above techniques will be enhanced if the crop is windrowed first. The following data (Table 3) was provided by Bill Roy from Western Australia.

Table 3. Impact of windrowing on the efficacy of ryegrass seed collection at harvest (Roy, 2000)

Ripe crop treatment	Seedlings /m ²	Percent control
Harvested, using chaff spreader	721	0
Harvested, chaff cart used.	256	65
Windrowed, harvest with chaff cart.	67	91
Harvested, narrow windrow (windrow burned)	543	25
Windrowed, harvest with narrow windrows, windrows burned.	131	82

Mulching Stubble

There may be an advantage in mulching stubble rather than leaving it standing. Mulching may speed-up decomposition of the stubble as well as being more effective at suppressing weeds.

Burning stubble, chaff piles or narrow windrows

Burning (late) is a useful, albeit controversial, technique in weed management. A second, and also controversial, point is that the impact of burning is maximised if stock are not put into the stubble beforehand because they tend to push weed seeds into the soil where they are safer from the fire. Chaff piles are less of a worry as they can be placed outside the paddock if needed. In addition, even if stock do walk over them, they only take up a small area compared to the narrow windrows so trampling will have less impact.

The data in Table 4 is derived from a long-term tillage experiment at Condobolin and graphically illustrates this point. The burning was carried out close to the break rain, mainly to minimise the chance of the fire burning out stubble-retained plots. Sheep were excluded throughout the experiment and each plot was treated the same way each autumn.

Grain crop, non-grain crop sequence

Given the current buoyant livestock product prices, a crop rotation that can work quite well could be a grain crop non-grain crop sequence. The advantage of this is that every second year is a weed management year. In this case, weed seed collection at harvest plays an important role.

Table 4. Impact of stubble treatment and cultivation on annual ryegrass numbers. (Ryegrass per square metre)

Year	Stubble late burned then cultivated	Incorporate stubble with offset disc	Stubble retained. Cultivate with sweeps
1993	1	6	10
1995	1	36	85
1996	1	189	204
1997	1	141	195
1998	0	41	28
1999	3	586	790

This data shows that burning can be a potent option. Whether it is an 'acceptable' option is another issue!

References:

Johnson, EN Nielsen, ME 2001 *Pre-emergent Tillage in Field Pea Effective, but Timing Critical*. Proceedings of the Canadian Expert Committee on Weeds Annual Conference.

Lemerle, D Verbeek, B Coombes, NE 1995 *Losses in grain yield of winter crops from *Lolium rigidum* competition depends on species, cultivar and season*. Weed Research, 35, 503–509

Lemerle, D Verbeek, B Cousins, RD and Coombes, NE 1996, *The potential for selecting wheat varieties strongly competitive against weeds*, Weed Research, 36, 503–513

Lemerle, D, Koetz, E Sutherland, SJM and Good, T, unpublished data. Influence of nitrogen placement on the competitive ability of wheat and ryegrass.

Roy, W. 1999, Unpublished data. Results of a ryegrass seed collection trial.

Broadacre Weed Control: Summary

To summarise the main points covered in the series by Steve Sutherland:

- Weed control needs to be a systematic process.
- You need to establish a goal and plan a program that suits the paddock and other farm enterprises and use as many techniques as possible to take action every year in the crop-pasture sequence.
- Consider: pasture options, fallow period options, sowing time options, in-crop options, harvest time options, and farm hygiene.
- Most importantly, have a thorough understanding of the targeted weed's characteristics and the most susceptible stages of its lifecycle.
- Changing soil characteristics can alter weed species composition.
- If fodder conservation is part of crop paddock preparation, consider making silage to minimise the spread of weed seed.
- Non-grain crops planted for green manure, forage, or fodder conservation, are powerful weed control options; if paddocks are ploughed down before weeds make viable seeds.

In the pasture phase, the following points should be considered:

- The composition of species selected for pasture leys should be considered for their weed potential in future cropping phases (such as, annual ryegrass).
- Legume-dominant perennial pastures, provided that they are planted at high seeding rates and ploughed down before non-legumes (weeds) become dominant, provide: an effective weed break; nitrogen to the crop; and, if deep-rooted (such as, lucerne) can lower watertables and recycle leached nutrients back into the crop's root zone.
- Weed management in pastures should consist of a combination of treatments including:
 - maximising the competitive ability of the pasture by dense seeding;
 - preventing weed seed set by grazing with different livestock species, depending on their selective grazing habits, topping (mowing), or by making silage or hay.
 - Following the pasture phase: fallowing or growing a summer forage crop can provide further opportunities to reduce weeds prior to winter cropping.
- Weeds should be well-managed in fallows through strategic cultivations and by grazing palatable species.

During the cropping year, the following points should be considered:

- Aim to germinate as many weed seeds as possible prior to sowing. A light autumn cultivation can stimulate weed seed germination, whilst delayed sowing an appropriate variety can provide additional opportunities to cultivate out weed seedlings.
- Care should be taken during sowing. Sowing equipment should be well-maintained and working accurately. Ensure that equipment is free of weed seeds; that full soil disturbance (shallow) is achieved; that the seed run is even; and that no gaps are left in the crop during sowing.
- The crop's competitive ability against weeds can be improved by:
 - Selecting seed for sowing that is weed-free and the plumpest (largest) available.
 - Selecting crops and varieties that are competitive and appropriate for the soil conditions
 - Increasing sowing rate. Factors such as seed size, tillering ability of the variety and soil moisture potential should be considered.
 - Don't sow any deeper than is absolutely necessary.
 - Minimising the width of press wheels.
 - Don't fertilise weeds; aim to band fertilisers directly with the seed.
- In-crop weed control options include:
 - Management of weeds in areas adjacent to the crop to prevent spread into the crop.
 - A post-sowing, pre-emergent cultivation to facilitate weed control.
 - Post-emergence harrowing against weeds if they are small and the crop is firmly anchored.
 - Small weed outbreaks controlled through hand roguing.
 - Dense weed patches mowed to prevent seed set.
- Harvest and post-harvest weed control options include:
 - Windrowing the crop before threshing, if the weeds have shed seed before the crop is ripe.
 - Harvesting clean areas of the paddock first; this helps avoid spreading weed seed from weedy to clean areas.
 - Collect weed seeds with the header. There are several ways this can be achieved.
 - Mulching crop stubble helps with breakdown and suppresses weeds.
 - Burning stubble, chaff piles or narrow windrows is a useful technique in weed management, however it is not a technique encouraged under organic standards.

Milk controls powdery mildew in pumpkins

Spraying organic vegetable crops like pumpkins with milk may be the main line of defence for growers to combat powdery mildew, according to researchers at NSW Agriculture's Yanco Agricultural Institute (YAI). Trials by NSW Agriculture have shown that milk, applied as a cover spray, can significantly reduce the incidence of the fungal disease which causes leaves to wither, ultimately reducing yields and exposing fruit to sunburn.

NSW Agriculture vegetable pathologist, Andrew Watson, said most organic growers rely on sulphur as an inexpensive and effective fungicide, however proposed new regulations may outlaw its use.

'Milk has given excellent control of powdery mildew in other crops so we decided to see if it would be just as useful in pumpkins,' Mr Watson said.

Trials of organically-acceptable treatments to control powdery mildew of pumpkins were conducted in 2002 and 2003 at the organic site at NSW Agriculture's Yanco Agricultural Institute. Treatments included milk, potassium bicarbonate, spray oil and sulphur. The various treatments were applied weekly when the disease was first seen at label rates with the milk applied at the concentration of 20 per cent with water. The upper leaf surface was sprayed with a knapsack sprayer.

The level of powdery mildew infection was assessed as the percentage of the upper leaf surface being covered by the fungus. In both seasons the disease developed close to crop maturity so did not have the potential for any yield loss. Sprays were applied weekly in both years with five applied in 2002 and four in 2003.

Whilst sulphur was clearly the most successful at controlling the disease in pumpkins, milk also showed reasonable success at controlling the disease. 'Should organic production standards change and withdraw sulphur, milk may be a real alternative for organic growers to use', Mr Watson said. Other control agents were also evaluated at Yanco including potassium carbonate and spray oil.

'Both these products recorded moderate levels of control, but not as much as milk,' he said. Whilst milk has been successful in combating late infections of powdery mildew, the real test using milk as a fungicide will come when powdery mildew is seen earlier in the crop's maturity. The earlier powdery mildew infects a pumpkin crop, the more devastating the damage. Future research will investigate the effectiveness of milk against early powdery mildew infections for a range of crops.

For more information, contact Andrew Watson on (02) 6951 2647.



Above: Trials conducted by NSW Agriculture researcher Andrew Watson have shown the benefit of using milk to help control powdery mildew in pumpkins. Photo: B. Fifield

Table 1. Percent leaf area infected.

Treatment (concentration)	Butternuts		Jarrahdale	
	2002	2003	2002	2003
Sulphur	6	1	3	9
Milk (organic full-cream)	41	3	11	8
Spray oil	32	24	33	32
Potassium bicarbonate	30	25	21	36
Nil (water-sprayed only)	90	84	74	93

Starting a business? Thinking of exporting? Try these organisations for help.

Robyn Neeson, NSW Agriculture Yanco

NSW Government Assistance

Department of State and Regional Development

The New South Wales Department of State and Regional Development (DSRD) provides information and contacts to assist new businesses to establish in NSW. Follow the following links for information on:

- What to do before starting a business
- Business structures — sole trader or partnership
- Buying an established business
- Renting premises
- Writing a business plan
- Identifying technology that will help your business

There is a wide range of tools and information about starting a business on DSRD's Small Business website.

Agsell

Agsell is the international export marketing arm of NSW Agriculture, Australia, providing crucial access for foreign businesses to the enormous resources of the Australian agriculture and food industries.

Agsell coordinates long-term grower contracts between the buyer and producer, and introduces investors to NSW agricultural industry contacts. Growers who already export may still need help with identifying new markets or increasing their sales to their existing markets. See http://www.agric.nsw.gov.au/agsell/division_3/div_3.htm to find out how Agsell can help.

Federal Government Assistance

New Industries Development Program (NIDP) and Agribiz

New Industries Development Program (NIDP) helps people in the agricultural, processed food, fisheries and forestry industries turn innovative business ideas into competitive, profitable and sustainable commercial ventures. NIDP encourages and supports Australian agribusinesses as they commercialise new market-driven products, services and technologies. For more information, check the website: <http://www.affa.gov.au/agribiz>

Austrade and TradeStart

Austrade and TradeStart offer a package of free services designed to assist small and medium-sized Australian companies develop their business overseas and make their first export sale. The TradeStart program gives Australian businesses the best possible start to exporting, by providing a wide range of free services to new exporters including advice and information about getting into exporting, export coaching and assistance on the ground in foreign markets.

To find out more about TradeStart and what the export advisors and Austrade's international network offers, go to: http://www.austrade.gov.au/australia/layout/0,,0_S2-1_1-2_-3_PWB1683756-4_-5_-6_-7_,00.html

Tips for exporting on-line

http://www.austrade.gov.au/IT/layout/0,,0_S4-1_wqcrz2g-2_-3_PWB110415747-4_-5_-6_-7_,00.html

Rising Star outshines falling herbicides

Organic and conventional farmers alike are set to benefit from the dedicated work of the Co-operative Research Centre for Australian Weed Management (CRCAWM). Co-ordinated from Wagga Wagga Agricultural Institute, the cropping program of the CRC is committed to innovative solutions, and their latest 'star' performer fits the bill.

Introducing the 'Star'

The 'Stubble Star' is every bit the image it conveys. Designed as a seed furrow opener, the implement is a cross between a trash removing wheel and a conventional double disc. In combination with high sowing density, the 'Stubble Star' can successfully control weeds without the need for herbicide. David Gregor, Weeds CRC agricultural engineer, is the man behind the 'Stubble Star'. With a number of achievements under his belt, he is excited by the enthusiastic way the 'Stubble Star' has been received by both industry and machinery manufacturers. He sees a great future for sustainable agriculture through his project's efforts to 'value-add to the ground tools we have already developed, to use them as the basis for a complete sowing unit'.



Above: David Gregor proudly displays the 'Star' potential of the Weeds CRC.

Although weeds have more opportunity to proliferate in stubble retention systems, producers need not choose between stubble and organics in their quest for sustainability. With the advent of the 'Stubble Star', both can be retained while still achieving successful weed management.

How it works

With a similar style to a conventional double disc, the 'Stubble Star' consists of two blades off-set at four degrees to the vertical. With a 24-point star-shaped design, one might be excused for thinking the 'Stubble Star' was better-suited to ninja warfare! But while this fearsome design is tough on straw, it is gentle on soil.

Organic advantage

The 'Stubble Star' has distinct advantages over a conventional tool, and should be appreciated by the environmentally-conscientious farmer. A combination of:

- superior straw-handling capability,
 - reduced soil compaction effects,
 - narrow row spacing adaptability, and
 - better fertiliser delivery,
- has ensured that 'Stubble Star' will efficiently manage weeds without reliance on herbicide.

Where a conventional double disc pushes straw deep into the furrow, the 'Star' points (termed 'fingers') part the straw prior to soil entry. Straw that is not deflected is sliced both by the edges of the 'Star' and at the intersection where two fingers join. Uncut straw is pulled back up from the furrow as the 'Star' rotates.

To determine what effect row spacing might have on weed incidence, this dedicated team of researchers planted trial crops by hand. They determined that, by decreasing row spacing to four times conventional rows, annual ryegrass in barley, canola, and lupins was more than halved... without the use of herbicides! Gregor's team is confident of obtaining similar results from the 'Stubble Star' in field trials.

It gets even better

While the 'Stubble Star' was invented with the intention of simply parting straw, the Gregor team found added advantages. Not only were weeds better controlled — crop yield also improved. In canola trials, as well as better weed suppression, David's team found they obtained 30 per cent better emergence.

Better crop emergence is attributed to favourable root development conditions imparted by the 'Star'. Where a conventional double disc will compact the soil it contacts by making a 'v' in the ground, the 'Stubble Star' actually lifts and aerates. 'Star' fingers enter the soil at a narrow point, then widen as the 'Star' rotates due to the off-set angle design. The soil does not resist this lifting motion, and no compaction results.

Star of the future

Organic farmers will be doubly-impressed by the latest additions to the 'Stubble Star'. While at this stage, the 'Stubble Star' is specifically a ground tool for handling straw, the Gregor team is aiming towards using it as a base for delivering precision fertiliser with seed.

In the same way that weed control is more restricted in organic systems versus conventional farming, organic farmers are faced with the difficulty of applying sufficient fertiliser, with fewer potent options available. But the newly-improved 'Stubble Star' will accurately localise fertiliser with the cluster of seed. In this way, weed seeds are denied access to the fertiliser, attuned to the motto: 'feed the seed, not the weed'.

At the same time, seed will be kept from harmful direct contact with the fertiliser. Under this design organic fertilisers such as Dynamic Lifter® could be efficiently-applied and utilised by the crop.

The 'Stubble Star' is expected to be commercially available by late 2005, and will be suited to adaptation to existing implements.

For more information, or for other weed related issues, contact: Therese McGillion, Weeds Communication Officer on (02) 6938 1618.

Publications, Events and Websites

Publications

Life in the Soil

VVSR Gupta, SM Neate and E Leonard. An informative, 12-page book which details the important relationship between soil biota and agricultural production. Can be downloaded at: <http://www.clw.csiro.au/staff/VadakattuG/soil.pdf>.

Organic Farming — Policies and Prospects

Stephan Dabbert, Anna Maria Häring, Raffaele Zanolì. February 2004. Published by Zed Books. 192 pp. Paperback ISBN 1 84277 327 5. Hardback ISBN 1 84277 326 7

Food retailers in Europe, including supermarkets, have responded to rapidly rising demand for organic produce. The organic sector has moved from a marginal production fad to a serious subject of policy concern for politicians and public servants involved in European agricultural policy. Drawing on a huge body of scientific research, this book:

- reviews the organic farming sector today and the policies developed towards it
- assesses its contributions to the environment, food quality, farmers' incomes, and rural development
- explains the key factors impinging on the organic farming sector in the future
- makes a detailed range of recommendations for future organic farming policy.

Papers and commentaries

Title: The performance of organic and conventional cropping systems in an extreme climate year

Author(s): D.W. Lotter ; R. Seidel ; W. Liebhardt

Source: American Journal of Alternative Agriculture **Volume:** 18 **Number:** 3 **Page:** 146–154

DOI: 10.1079/AJAA200345

Publisher: CABI Publishing

For full text see: <http://iris.ingentaselect.com/vl=1064047/cl=17/nw=1/rpsv/ij/cabi/08891893/v18n3/s4/p146>

Title: USDA research on organic farming: Better late than never

Author(s): James F. Parr

Source: American Journal of Alternative Agriculture **Volume:** 18 **Number:** 3 **Page:** 171–172 **DOI:** 10.1079/AJAA200346

Publisher: CABI Publishing

For full text see:

<http://iris.ingentaselect.com/vl=1064047/cl=17/nw=1/rpsv/ij/cabi/08891893/v18n3/s7/p171>

The ecological production of cereal crops is more profitable in semi-arid areas. (Spain)

Ecological systems of production of cereals are based on the rotation of crops, the use of natural organic additives and the mechanical control of weeds, in order to maintain the fertility of the soil and weeds in the long-term and at reasonable levels. http://www.innovations-report.com/html/reports/agricultural_sciences/report-25708.html

Websites of interest

<http://www.planorganic.com/index.htm> provides:

- organic food and farming news, Ireland, UK and Europe, with robust, independent comment
- information on where to obtain and enjoy organic products in Ireland, the UK and beyond
- references to almost all publications on organic and sustainable food and farming issues
- articles and papers on sustainable/organic farming and related subjects
- a guide to the best associated sites on the web

Soil Biology Primer (US Dept of Agriculture) http://soils.usda.gov/sqi/soil_quality/soil_biology/soil_biology_primer.html

Biological management of soil systems for sustainable agriculture. Report of the international technical workshop. June 2002. <http://www.fao.org/ag/agl/agll/soilbiod/docs/WSRR%20101%20Complete.pdf>

Online Farmers Market

<http://www.farmersonlinemarket.com/>

Events

Agroecology Conference

International Conference on New Directions in Agroecology: Productivity and Sustainability. To be held at the Mildura Campus of La Trobe University, Benetook Ave, Mildura, Victoria between Sunday 29 August and Saturday 4 September 2004. More information is available from the conference Website: http://www.latrobe.edu.au/mildura/science_conference.htm#4

Second Australian New Crops Conference

in association with ACOTANC-2004 21–24 September 2004 University of Queensland Gatton Campus 85 km west of Brisbane; 45 km east of Toowoomba. More information: <http://www.newcrops.uq.edu.au/nc2004/index.html>

International Events:

1st International Symposium for Organic Fruit and Wine Growing

May 12–13 2004 Stuttgart/GERMANY ECOVIN and the German Winegrowers Association (DWV) are jointly organising the 1st International Symposium for Organic Fruit and Wine Growing, which will be held as part of INTERVITIS INTERFRUCTA 2004. Contact: ECOVIN - Tel.: +49 (06133) 1640 e-mail: ulrike.gebert@ecovin.org

Western Japan International Food Fair (IFF) 2004

Western Japan General Exhibition Centre Annex. Kitakyushu, Japan, beginning October 1, 2004. A biennial food & beverage food expo, this event is the biggest speciality food exhibition in Western Japan and attracts approx 100,000 visitors. Australian producers and manufacturers of food and beverage products, organics, and retail services seeking entry into the food markets of Western Japan, Korea and Taiwan should attend. For more details contact: James Myers. AUSTRADE

Tel: (81,92) 734 5055; Fax: (81,92) 734 5058; e-mail: james.myers@austrade.gov.au

Mid North Coast Organics Seminar

A seminar for organic producers will be conducted by the Mid North Coast Regional Development Board at Port Macquarie on May 26 2004. Contact Lyndell Stone on (02) 6583 5647 or e-mail: fip@betterbusiness.nsw.gov.au

Do you have any Organic News?

Do you have any research results, field day reports or other information that may be of relevance to organic agriculture? If so, let us hear about it! Send your contributions to:

Robyn Neeson Editor, *Organic News*

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