

Ryegrass types

Italian or Annual Ryegrasses

Italian and annual ryegrasses used for autumn and winter cover crop plantings have a rapid establishment and produce excellent dry matter (both leaf and root) during the winter and spring period.

Annual ryegrasses will seed in October/November so incorporation or mowing is necessary before this period to avoid seeding.

Hybrid ryegrasses such as Mavrick Gold are suited to high fertility soils. They will produce a very deep fibrous root mat and will establish well in cold or wet winter periods.

All hybrid and some annual ryegrasses can last through the spring and into summer, producing

equivalent or higher levels of dry matter than perennial ryegrass. However they may seed in summer, necessitating the need to plough in before this stage or to mow then. Most hybrid ryegrasses can be cut for hay or silage if suitable growth is achieved during spring providing additional income.

Sow annual or hybrid ryegrasses at 25 kg/ha. For ryegrass sowing the seed bed should be rolled before drilling. Ryegrass that is used as a cover crop should not be allowed to go to seed. This can be achieved by mowing or grazing. Breakdown of the ryegrass will be more rapid and regrowth avoided if it is sprayed with Glyphosate based herbicides (eg Roundup).

Advantages of Ryegrass	Disadvantages of Ryegrass
Its massive root system is good for soil structure	Can be a problem of regrowth if not ploughed in at the right time
Very good weed control	Added cost of herbicide if sprayed before ploughing
Can be cropped and used as hay, balage etc	Due to its bulk it can be difficult to plough in
Encourages earthworms	

Phacelia

Phacelia tanacetifolia is described as being a flowering herb, with lush stalks and leaves similar to Bracken Fern and a mass of purple flowers in summer.

Phacelia is best grown as a cover crop if sown between spring and early autumn. Phacelia has quick establishment with good nitrate uptake. Flowering phacelia is also very attractive to bees, hoverfly and other aphid predators.

Phacelia should be sown at a rate of 5 to 10 kg/ha.

"At Onewhero where we have a cover crop the fibre is fantastic for minimising soil erosion. There is no where near the same runoff"

DINESH BHANA
Hira Bhana and Company Ltd

"When we started using oats as a cover crop we didn't see much progress after the first year but after two to three years you can see the whole soil structure improve ... It gets better each time ... it is a time thing."

GANPAT HARI
RC Hari Ltd.

Advantages of Phacelia	Disadvantages of Phacelia
Has a very fast break down rate, therefore soil available for next crop sooner	Seed can be expensive
Easy to incorporate into the soil	Breaks down very fast so has little longterm benefit for adding organic matter
Has a deep tap root, similar to lupins, which may help to break up cultivation pan	Needs a fine seed bed so requires more soil disturbance

Mustard

Can be sown from October through until mid April. Sow at 10 - 12 kg/ha as broadcast or drilled seed. Mustard produces a quick ground cover in warm conditions, and readily breaks down in the soil. Avoid seed development on the cover crop as this can cause mustard to be a weed in following crops. Cultivate the cover crop into the soil before full flower. Mustard is a host to clubroot and should not be used if this disease is present in the field, or where Brassicas are a main part of the crop rotation.

The use of cover crops, particularly oats, has increased throughout the Franklin District recently. This will have long-term positive benefits for soil erosion control, soil structure and nitrogen recycling.

Other Reading:

Year two results from the cover crop and nitrate leaching experiments in the Franklin Sustainability Project P.H. Williams, C.S. Tregurtha, G.S. Francis Crop and Food Research Limited (Copy available from Agriculture New Zealand)

The "practical" guide to sustainable agriculture Commercial Grower, August 1998, Vol 53 No 7 page 25-29

Growers Opt for "sustainability" Commercial Grower, July 1998. Vol 53 No 6 page 6-8

Franklin Sustainability Project Newsletter No 4, 5, 7 and 8

Advantages of Mustard	Disadvantages of Mustard
Quick growing cover crop	Host to clubroot
Easy to incorporate into the soil, and leaf material breaks down rapidly.	Can leave mustard seeds in field as weeds
Leaves soil very open with stalks providing improved soil conditions	Needs a good seed bed, and only grown over summer months

"Even where we have only a two month break between crops we will still drill a cover crop in, it is still worth it."

"You can see more growers using cover crops now. The district will benefit."

DINESH BHANA

Hira Bhana and Company Ltd

For more information call

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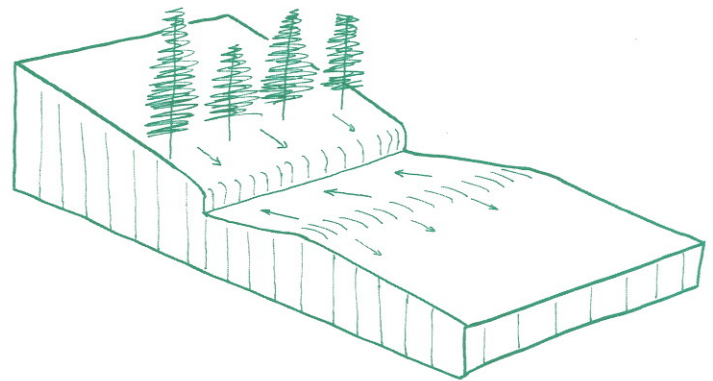
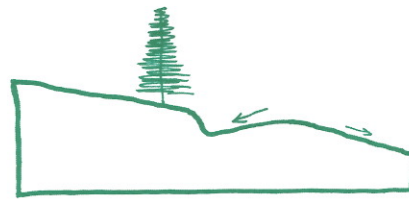
Headlands

Modifying headlands is a simple and effective way of controlling and managing soil and water runoff from paddock rows, particularly wheel tracks.

Often called 'benched' or 'contoured' headlands, the entire headland area is designed to trap or direct water to the side of the paddock or to a drain within the paddock.

One option is to form a broad shallow 'V' shape with the bottom of the 'V' between the headland and the end of the rows. A second option is to shape the headland away from the rows, sloping towards an earth bund. The headland is still used in the normal manner for access to planting, spraying and harvesting operations.

Ideally, the headland should be grassed, which protects it from scouring and encourages silt to drop and be held on the headland.



Benched headland



This permanent headland has been installed in the middle of a long paddock - effectively breaking it into two drainage areas. The headland can still be driven over normally.

The easiest way to construct a benched headland is using a grader blade. Once in place, particularly if it is grassed, the only maintenance needed is to clear deposited soil and reshape in dry conditions or whenever scouring occurs. Regrassing the headland may be necessary from time to time.

Benched headlands are used to good effect in breaking up the length of long paddock runs. If constructed to a broad shallow design, a tractor can be driven across the headland.

"Headlands and drains run into silt traps or vegetated gullies where the water is slowed down and silt drops out."

DON MORROW
D & L Morrow Ltd.



Headland



Don Morrow

When constructing a benched headland attention needs to be paid to:

- Where water from the benched headland is being directed, for example to a permanent drain which will carry it off-site in an effective manner.
- Where silt will be deposited in the benched headland, and further down the drainage system.

Scouring of benched headlands can occur if:

- Excessive water volumes flow in to a headland. Use cut off drains across the field to reduce this.
- Soil in the bottom of benched headland is soft.
- The slope of the headland is too steep, creating huge water speeds during high rainfall. Take measures to reduce volumes reaching the headlands by diverting water to drains or small weirs to reduce water speed.

"We plan our paddock layout so that the longest run is just 10 chains (200m). Any longer and the rows become scoured out."

DON MORROW
D & L Morrow Ltd.

The biggest problem with headlands is that many have been designed to carry water straight to the roadway/accessway and flow out onto the road or into the top of an unprotected paddock. Check what happens when the water reaches the end of a headland and make sure the headland connects with a suitable control measure.

See the factsheets on Raised Accessways and Silt Traps for possible solutions.

"Our large paddocks are all broken up with headlands and the beginning of rows blocked with soil."

DON MORROW
D & L Morrow Ltd.

Other Reading:

FSP Newsletter No. 12 May 1999.

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Hedges

Hedges are an underrated soil erosion management tool. They act as very efficient silt traps with the minimum of construction and maintenance needed.

Hedges act as barriers that catch silt before it can leave the paddock. They are natural silt fences.

Barberry hedges are the most common form of hedge used in the Franklin District, but most hedge species or shelter belts will perform the same task, in conjunction with the grasses and annual plants/weeds under them.

Pioneering growers understood the benefits of having hedges and used them extensively.

More recently, some of these hedges have been removed as they age or paddock configurations change. This makes replacement or maintenance of hedges in strategic areas very important.

Hedges are effective:

- At the bottom of slopping paddocks.
- Where there are no other control measures between the paddock and a drain.
- Between properties or paddocks.
- Combined with other measures, such as contoured headlands where they can be used to stop water entering a paddock from above.



Good example of hedge: few gaps and good cover to ground level



Bad example of hedge: note the extensive gaps

"We split our paddocks with hedges - short runs are the key particularly as the slope increases."

VINU PARSOT
Morar Parsot and Sons Ltd

Remember, hedges are only part of an erosion control system and need other control measures in place to complement their benefits.

Hedge maintenance

Maintenance is very important if the hedge is going to be effective. Only two forms of maintenance are required:

1 Regular trimming

An annual trim will encourage the hedge to grow thickly, especially at ground level. Barberry hedges should be about one metre thick and between 1.5 and 2 metres high. Other species such as Cryptomeria, Casurina, Poplars, Leyland Cypress and Willows are taller and should be trimmed to suit the species.



Hedge on the raised bund that has been formed by the hedge trapping and holding soil.

"We use hedges as part of our raised bunds on the headlands. They hold the bund together, acting as a fixed barrier and preventing them from being gouged out."

VINU PARSOT

Morar Parsot and Sons Ltd

2 Ensuring the hedge is continuous

Gaps in a hedge will allow both water and soil to move through unchecked. To avoid this, gaps should be filled by planting young plants and encouraging the hedge to grow together.

Barberry hedges are one of the most under rated forms of soil and water management tools you can use. They are a permanent, effective measure which require little maintenance and are cheap to establish and maintain.

Other Reading::

FSP Newsletter No. 12 May 1999.

Grass Trial

A trial at Bombay, established in 1999 is assessing the viability of Lemon Grass and Vetiver Grass for border planting and trapping of sediment. These tropical grasses remain largely untested in New Zealand, but they have a dense rigid stem for trapping and holding soil. You may like to experiment with some species but choose plants which:

- will not harbour economic pests or rodents,
- will not proliferate and become field weeds,
- will be low maintenance (eg. trimming and mowing),
- have a dense upright habit.

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Cultivation Techniques

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29 Cultivation Techniques



Grant Ryan

"We have definitely reduced the number of passes . . . we do less deep ripping now and use more cover crops to help break the soil down."

GRANT RYAN
May and Ryan Ltd



Cultivating too close to drains or water ways can cause erosion and have major downstream effects. A buffer of at least five metres should be left.

How, when and where cultivation is done can have a BIG impact on the erosion potential of your soil. Good cultivation techniques can increase productivity and help conserve soil and keep it in good condition for the future - a bit like money in a savings account!

Some do's and don'ts for soil cultivation

- ✓ **DO let the weather do some of the work.**
The weather is capable of breaking up soil aggregates, reducing the number of tractor passes.
- ✓ **DO minimise the number of passes over the paddock wherever possible.**
Every cultivation pass results in the loss of some organic matter through decomposition and can have a detrimental effect on soil structure.
- ✓ **DO maintain the organic matter level of your soils.**
Cultivation reduces organic matter. Restoring organic matter can be done with the use of cover crops (see the cover crop factsheet). Organic matter is critical for maintaining the stability of soil aggregates, reducing nitrate leaching and allowing easier preparation of seedbeds, so don't underestimate this factor.
- ✗ **DON'T cultivate right up to the sides of drains or streams.**
This will only speed up the loss of soil from paddocks, silt up streams and create more maintenance.
- ✗ **DON'T cultivate when the soil is too wet.**
The best way of reducing compaction and the formation of pans is to avoid being on the land when it is too wet.

"We are now letting the weather break the soil down a lot more, rather than using several passes with the rotary hoe. We have been able to let the paddock sit fallow for longer by putting in more drains, keeping water off with benched headlands and incorporating cover crops."

GRANT RYAN
May and Ryan Ltd



Cultivating a field to produce rough clods

Vegetative Cover

Soil is most vulnerable to erosion when it is left fallow. Any vegetation cover (crop, cover crop or even weeds) will reduce this erosion by:

- Reducing the velocity of the water as it moves over the soil surface.
- Increasing soil stability and infiltration of water due to the plant roots and biological activity.
- Drying out the soil which increases the water infiltration rate into the soil.

However, it is not always possible to have a crop cover, and at some stages in the rotation it is necessary to leave the soil fallow. The danger is if this fallow period coincides with high rainfall, soil may be lost due to the effects of erosion.

The single most effective thing to do to minimise this erosion risk is to have a cover crop ploughed back into the soil. The plant residues add dry matter to the soil which help to bind or hold the soil together, increase the organic content of the soil and reduce the amount of erosion.

Other effective methods to avoid erosion are to leave the soil in an open, loose and rough (cloddy) condition, or ridge into large or small rough ridges (such as for potatoes) or form ridges using a tyned implement with only a few tynes.

Deep and shallow subsoiling

Several FSP studies were carried out to determine the effect of both deep and shallow subsoiling on the percolation of water through the soil profile. The results indicate that:

- Both deep and shallow subsoiling were effective in loosening the soil and improving deep percolation of water.
- Deep subsoiling loosened the soil in a narrow band to a depth of 50-60cm.
- Shallow subsoiling loosened a broader zone of soil to about 40cm deep.
- Shallow subsoiling produced better infiltration of water over the autumn / early winter period.
- When subsoiling was carried out in April loosening effects were still measurable three months later.

"It is going back to more like what our fathers did, perhaps we just needed reminding again."

GRANT RYAN
May and Ryan Ltd

Other Reading

FSP Newsletter No. 9 August 1998.

For more information call

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Contour Drains



Daniel Brownlee checking a contour drain

"Maintenance is important no matter what the control measure is. Drains need to be regularly checked .. take a shovel with you."

DANIEL BROWNLEE
Daniel G Brownlee Ltd

Contour drains are temporary drains used to collect runoff water.

They effectively reduce the length of rows that runoff water can flow down, by collecting water in shallow drains that run at a gentle gradient across the slope of the paddock. Water is then channeled sideways into permanent drains or grassed alleyways, before it is able to increase in volume as it flows down the rows. Contour drains also control the speed of runoff water when the correct gradient is used.

Contour drains **MUST** discharge into a permanent drain, otherwise the problem of erosion is simply shifted from inside the field to the outside. The permanent drain must be capable of handling the volume of water discharged from the contour drains.

To work well, contour drains must be designed and constructed properly, taking the field's characteristics into account.

The rules of thumb are:

1. **The shorter the contour drain the better**
- to keep water volumes low
2. **A drain slope of 1.5 - 2.5 percent**
- to keep water speeds low
- use an abney or dumpy level. Trying to 'eye ball' it never works well
3. **Spaced 20 - 80m apart**
- to be able to handle the volumes of water
- depends on paddock slope - see table below
4. **Make them 15 - 30cm deep**
- to avoid overflowing, or silting.

Paddock slope	Drain spacing
Greater than 10% (i.e. 10m rise per 100m length)	20m
3 - 10%	30m
Less than 3%	50m



"I have been successful using contour drains as a way of shortening row lengths for many years, particularly as the slope increases."

DANIEL BROWNLEE
Daniel G Brownlee Ltd

Contour drain spacing

Use these measures as a guide when determining the spacing of contour drains:

1. Paddock slope

The steeper the slope, the greater the number of contour drains needed.

2. Soil type

Heavy clay soils, soils with high organic content or soils with a coarse tilth can have contour drains spaced further apart than the standard recommendations.

3. Crop

Crop type will also influence spacing of contour drains. Crops such as potatoes can have wider spaced contour drains than crops like onions.

4. Time of year

It is more important to have contour drains in winter crops, such as onions, than summer crops like lettuce or brassica crops. However rainfall patterns are so unpredictable that as an insurance policy it is a good idea to use them all year round.

As a general rule contour drains should never be more than 80m apart.

Getting the spacing of contour drains right is very important. Getting it wrong can actually create more problems than it solves. The golden rule is to avoid placing drains too far apart, as contour drains spaced too widely can overflow and CAUSE erosion.



Close up of contour drain

It is important to ensure contour drains are not:

- Too far apart - leads to overflowing
- Too steep - leads to scouring out
- Too flat - leads to overflowing
- *Get it right, get it surveyed.*

Contour drains should be put in immediately after sowing the crop - not the next week. It may be too late or may not get done at all.

"You never stop learning . . ."

DANIEL BROWNLEE
Daniel G Brownlee Ltd

Other Reading:

FSP newsletter
No 12 May 99

**If you are serious about using contour drains,
set them up right in the first place and maintain them
- otherwise don't use them at all.**

For more information call

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" . . . once the soil has gone it is gone forever."

JASON THOMAS
ST Growers Ltd.

Contour drain slope

It is important that contour drains are sloped correctly. If too flat they can silt-up or over flow, if too steep they become gouged-out. The best way to get the slope right is to survey the paddock to get the right fall in the contour drains.

FSP trials suggest a slope of 1.5 - 2.5 percent is appropriate for the soil and rainfall conditions in Franklin. Very little slope is required for a successful contour drain.

The most common fault seen with contour drains around the district is that they are too steep and too far apart.

To compensate for this they are often deeper than necessary and therefore become a hindrance to traffic, such as sprayers. At too-wide spacings the contour drains often overflow and can cause more damage from erosion than if not used at all, by concentrating runoff water at the overflow position.

Contour drain length

For contour drains **shorter is definitely better**. The longer the drain, the more likely it is to overflow. As a guide the Kindred Landcare Group in Tasmania, on similar soils to the Franklin area, recommend that **contour drains be no longer than 50m**.

Contour drain construction

Experience at FSP field days has shown that "the eye-ometer", that is judging the slope by eye, is not very accurate. Instead use an Abney Clinometer, two equal length poles, an assistant and marker pegs.

1. Stand at the top of the paddock halfway between the vertical drains on either side of the paddock, or at the far side of the paddock if there is only one vertical drain.
2. Send your assistant to the edge of the paddock, their pole held upright.
3. Set the clinometer to the required angle. Rest it on your pole and look through it.
4. Ask your assistant to move down the paddock until the top of the poles line up with the hairline on your clinometer.
5. Peg both your and your assistant's position. This is the line for the contour drain.
6. Both move down the paddock 20 - 80m, depending on the paddock's characteristics, and repeat steps 3, 4 and 5.

Once pegged out, drains can be constructed with a grader blade set on an angle. Soil should be pushed to the downhill side. Drains may need to be finished off by hand.

"Contour drains can be a pain sometimes to drive the sprayer over, but in a part of the paddock where I didn't use a contour drain you can see how the wheel tracks have scoured out."

JASON THOMAS
ST Growers



Integrated Pest Management

b1 Thrips Control in Onions

b2 Brassica IPM

Thrips Control in Onions

Version 1, 2000

Franklin
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Factsheet

b1 Thrips Control in Onions

Resistance Management Strategy

In the period from 1997 to 1998 the onion thrips population in the Pukekohe District developed high levels of resistance to the Synthetic Pyrethroid (SP) group of chemicals. A management strategy has been developed over two years to both achieve effective control and restore the Synthetic Pyrethroid chemicals to effective use.

The Strategy is based on:

- Control of thrips in overwintering sites, such as self-set onions and dump areas.
- Monitoring at regular intervals to determine when to apply insecticides.
- Using insecticides in clusters of sprays for each product then changing to a chemical from another chemical group.
- Using the SP products later in the growing season.

Management factors at harvest, such as topping methods, length of tops on bulbs, timing of topping, length of time onions are in the field and shed conditions also have been shown to have an influence on the level of thrips infestation in stored onions. Research on this is continuing, as many factors in this area are not known.

Sources of thrips

Self-set onions and dump areas are the primary source of new thrips infestation each spring. By September young onions in newly sown fields can be infested. Stored onions in sheds are also a source and fields close to storage sheds need to be carefully monitored.

- Remove self-set onions in the fields by the end of August by cultivation or with herbicides in fallow areas. In young onion crops and other vegetable crops such as lettuce, carrots and Brassicas, hand pulling will be necessary to remove the self-sets.
- In dump areas, cover the onions to prevent new growth on the dumped onions from becoming a source of thrips.

Monitoring

From early October or from the four leaf stage, monitor crops by inspecting 100 plants in each field every two weeks. Select 20 sets of five plants with 10 sets from the main part of the field and 10 sets from the edges. If more than six thrips are found in the 100 plants, commence spraying.

From November onwards, monitor crops every week, checking 50 plants as 10 sets of five plants. Check equal numbers of plants on the field edges as in the main part of the field. If three or four thrips are found in the 50 plants, check a further 50 plants.

*If **six or fewer** thrips are present, do not spray;*

*If **seven to nine** thrips, schedule to spray in one week;*

*If **10 or more** thrips, spray immediately.*

Before topfall, commence to apply a cluster of three or four insecticide sprays at five to seven day intervals.

Cluster of Sprays

When spraying is needed, use a product for a maximum of three or four sprays in a single sequence, then change to another product from a different chemical group. Use the Organophosphate products earlier in the spraying season and use the SP products later.

Do not use the SP products near topfall, or mid January on later seeded or maturing crops. Where still effective, the SP products will control thrips for five to seven days (based on trials in 1999/00).

Choice of insecticide

Use *alternative chemicals* to SP products before the pre topfall sprays. Rotate the use of insecticide groups for each cluster of sprays before this period. These are short-lived products with approximate effective periods of Nuvan (one day), Folidol (one to two days), Thiodan and Basudin/Diazinon (two to three days) - very short.

After early January the choice of insecticide from the SP, OP or other groups can be continued at each grower's choice, but keep rotating these groups and consider the withholding periods. Refer to Tables 1 and 2.



Onion thrip

Table 1: Synthetic Pyrethroid Insecticides

Product	Active ingredient (insecticide)	Withholding period for onions
Baythroid 5EC	Cyfluthrin	14 days
Decis Forte	Deltamethrin	14 days
Dominex 100	alpha-cypermethrin	14 days
Karate	lambda-cyhalothrin	14 days
Mavrik Flo	tau-fluvalinate	14 days
Ripcord	Cypermethrin	no label claim for onions
Talstar 100EC	Bifenthrin	no label claim for onions

Table 2: Non-pyrethroid Insecticides

with label claims for use on onions or thrips control on vegetable crops.

Chemical class	Product	Active ingredient	Withholding period
Cyclodiene	Thiodan	Endosulfan	28 days
Organo-phosphate	Basudin 50 WP	diazinon	14 days
	Diazinon 50 W	diazinon	14 days
	Folidol M 50	parathion methyl	14 days
	Nuvan 1000 EC	dichlorvos	3 days

NOTE: The insecticide rotation strategy will be updated regularly as new research and chemical formulations become available. This factsheet is version 1, July 2000.

Other Reading:

1999 – 2000 Strategy for Control of Onion Thrips. Overwintering sites and early spring infestation of onion crops N A Martin.

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