The Essential Guide to Forage Crops
The essential guide to forage crops has been published to help farmers and growers plan an effective forage cropping programme. Although grass has to be the first priority to feeding livestock efficiently, forage crops can play an important role especially when grass growth dips in the summer months. Many of the crops featured in this guide also allow growers to extend the grazing seasons in both spring and autumn which can enhance profitability.

Conserved fodder crops such as Maize and Fodder beet also offer growers the ability to store and feed crops throughout the winter months, providing a fantastic opportunity to reduce costs.

THE VALUE OF MIXED FORAGE DIETS

Home grown feeds can help to produce an excellent part of a mixed forage diet. Understanding the feed requirements of your animals will ensure maximum returns.

Mixed forage diets will help increase intakes and ensure optimum rumen stability, improved feed utilisation and animal performance.

Many forages are now better understood leading to improved intake predictions, and accurate assessments for both energy and protein requirements.

The opportunity for UK farmers is to exploit the use of home grown forages and reduce their cost of production.

Forage crops - features and benefits

- Improved profitability
- Reduced reliance on purchased feed
- Full traceability
- Flexible cropping options
- An excellent break crop & entry back to grass
- Extend the grazing season
- Outwintering options
- Low inputs
As one of the world’s major plant breeders – Limagrain are continuously striving to improve plant genetics to benefit crop production.

As an International cooperative owned by farmers we know that our plant breeding skills can be used to improve the performance of key varieties used for animal production.

We have Plant breeding programmes in many of the key crops groups such as:

- **Maize** – Varieties bred specifically for the UK
- **Fodder Beet** – Varieties capable of delivering very high dry matter production with clean, easily harvested roots.
- **Cereals** – Varieties with excellent agronomic benefits
- **Forage Brassica** – We currently have breeding programmes for Swede, Forage Rape and Turnip.
- **Oilseed Rape** – superior varieties with excellent UK agronomic features
- **Grass** – breeding high dry matter yielding varieties that can be cut and silaged or grazed frequently.
- **Forage Rye** – Varieties that can deliver high yield performance.
- **Peas** – Forage, combining and vining varieties are bred in the UK.

**Local Knowledge**

Our local knowledge about UK farming practices and conditions ensures we only select the best of the best for our own climatic conditions. Not all varieties perform well in the UK’s varied climate and our breeding and trials teams ensure that our varieties have been fully trialled and tested before commercial sales are undertaken.

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Many of the varieties listed in this guide have been bred by The James Hutton Institute in Dundee. They represent varieties that have been bred in Britain for our conditions and offer an excellent combination of both yield and disease resistance.
What’s in this guide

- **Why grow the crop**
  A quick summary about the crop benefit

- **Growing costs, yield & feed quality and sowing information**
  Essential crop information

- **Variety profiles**
  Technical description about the key varieties

- **Trial results**
  Latest UK variety trial data

- **Selection guide**
  How to select the correct variety

- **Growing & sowing**
  How to successfully grow the crop

- **Crop suitability**
  Which animals are best suited to utilise the crop
Why grow fodder beet?

- Huge palatable yields
- Ideal replacement for cereals
- High energy feed
- Clamp and store overwinter
- Improved milk yields
- Palatable & nutritious
- Can be grazed in situ for outwintering systems

Soil Type/Site Selection:
The crop can thrive on a wide range of soils but a light to medium, free draining field is ideal. A soil pH of 7 is the target and good accessibility is vital for heavy harvesting machinery.

Seedbed & Sowing Methods:
Aim for firm, fine tilth with pre-Christmas ploughing. Keep moisture loss to a minimum in the spring. Monogerm seed has eliminated the need for labour intensive singling. However, allow for some field losses if seedbed conditions are poor. As a general guide soil temperatures need to be at least 5°C before sowing. Early April is a typical drilling date in the South. Delayed drilling leads to yield losses. Ensure that the seed is drilled to a depth of 2.5/3.0 cm – use the deeper figure for dry seedbeds. A precision drill is essential.

Fertiliser:
This is a demanding crop in terms of nutrients. All the fertiliser, except the nitrogen, is best applied in the autumn. The nitrogen can be applied immediately after drilling. The use of slurry/FYM will be beneficial, as is the application of sodium on appropriate soil types. Trace elements (especially manganese and boron) are important to fodder beet.

Weeds, Diseases & Pest Control:
Some farmers may be prepared to undertake inter-row cultivations but most now prefer to rely on herbicides to control weeds. It is vitally important to control weeds as their presence can severely reduce yields. Weed beets are very undesirable and every effort must be made to eliminate them.

Our seed is treated with both fungicide and insecticidal products to provide protection during the establishment phase. The crop can be attacked by several pests including slugs and wireworms while aphids transmit virus yellows.

Harvesting:
Although the crop continues to put on yield into the autumn this has to be balanced against the potential problems associated with late harvest. Some farmers have their own lifting equipment while others will use a contractor. Machines can be divided into ‘leaf’ or ‘root lifters’ – whichever is used the tops must be removed down to the base of the leaf petioles. Keep soil contamination to the minimum.

Sowing Information

<table>
<thead>
<tr>
<th>Sowing period</th>
<th>Late March to end April</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct drill</td>
<td>100,000 seeds/ha 50,000 seeds/acre</td>
</tr>
<tr>
<td>Seed sold in one acre packs</td>
<td>[50,000 seed units]</td>
</tr>
</tbody>
</table>

Yield & Feed Quality

| Average dry matter yield | 13-15 tonnes/ha |
| Average fresh yield      | 80-90 tonnes/ha |
| Dry matter 12-19%       |                |
| Crude protein 12-13% [mainly leaves] | |
| Digestibility value 78D |               |
| Metabolisable energy 12.5-13.5 MJ/kg DM | |

Growing Costs

| £1460 per hectare |
| Fresh weight £16 per tonne |
| Dry matter £115 per tonne |

Growing Costs

- £1460 per hectare
- Fresh weight £16 per tonne
- Dry matter £115 per tonne

Fodder Beet

Never lift too early.
Crops continue to grow up to end October
RIBONDO (Rhizomania resistant)

Ribondo is a Rhizomania resistant variety that has very erect leaves ideal for harvesting with either leaf lifting or sugar beet equipment. Rhizomania is becoming a major problem in some areas of the UK. The disease can cause unacceptable yield losses, and the use of Ribondo will also help reduce the build-up and distribution of this disease especially in sugar beet growing areas.

BLAZE

Blaze has the potential to produce excellent dry matter yields with very clean bright red roots. Blaze is a medium dry matter variety which enables the roots to be fed whole or chopped. Low dirt contamination ensures high intakes with no scouring.

BLIZZARD

Blizzard has the potential to produce very high dry matter yields. Blizzard’s characteristics make it ideal for harvesting with sugar beet machinery and with its high dry matter content allows growers extra harvesting flexibility. It will produce a very palatable feed best fed to dairy or beef animals because of the high DM content.

ROBBOS

Robbos is a recent introduction. It had the highest dry matter yields in our trials and with a clean yellow root and medium dry matter content makes it an ideal choice for both dairy and beef production.

Variety Profiles

Root Storage:
A pre-cleaner is recommended to remove soil contamination. Clamps should be checked regularly for signs of any hot spots. The high DM varieties tend to store better on a long-term basis and are less prone to damage.

Feeding:
Fodder beet may be fed chopped or whole. Chopped beet should provide a better LWG in beef animals. Feeding the roots at ground level can reduce the risk of choking. The roots have a high energy but low protein content and make a good substitute for grain in rations for dairy cows, beef animals, sheep, pigs and deer. Crops have also been strip grazed in outwintering systems.

Preferred Varieties

Crop Suitability

- GRAZE IN SITU
- DAIRY
- ZERO GRAZE
- BEEF
- ENSILE
- SHEEP
- LIFT & STORE
- PIGS

Fodder Beet VARIETY SELECTION GUIDE

What type of Harvester is available?

- leaf lifter
- sugar beet lifter
- graze in situ / outwintering

- Robbos
- Blaze
- Ribondo
- Blizzard
- Blaze
Sowing Information

- **Sowing period**: April – mid July
- **Precision drill**: 2kg/ha (750g/acre) Grade J
- **Direct drill**: 4-5kg/ha (1-2kg/acre) Natural seed
- **Broadcast**: 8kg/ha (3kg/acre) Natural seed

Yield & Feed Quality

- **Average dry matter yield**: 8-10 tonnes/ha
- **Average fresh yield**: 60-65 tonnes/ha
- **Dry matter**: 14-16%  
- **Crude protein**: 16-17% fresh, 19-25% ensiled
- **Digestibility value**: 68D
- **Metabolisable energy**: 10-11 MJ/kg DM

Growing Costs

- **£496 per hectare**
  - **Fresh weight**: £9 per tonne
  - **Dry matter**: £67 per tonne

Why grow kale?

- Low cost option for finishing lambs
- Buffer feed for dairy cows during dry summers
- Flexible utilisation period
- Excellent crude protein content
- High yields and economical to grow
- Outwintering systems

Soil Type/Site Selection:
Kale grows best on a medium loam soil with a pH of around 6.5. It needs a well-drained soil which is not compacted. If you grow Kale on a very heavy soil remember that you might have problems strip-grazing in a very wet autumn/winter.

Seedbed & Sowing Methods:
A firm, fine and level seedbed is required and this needs to be achieved with minimum moisture loss (especially on dry soils).

Kale seed should be sown between mid-April and mid-July. Early sown crops which establish well are more likely to give the highest yields. The seed can be broadcast or sown with a precision or root drill. Under normal conditions a seed rate of 4-5 kg/ha should be adequate. If seedbed conditions are very dry, or the crop is broadcast, then the rate can be increased slightly as an insurance. The target population is 70 plants/sq metre whichever sowing method is used.

Fertiliser:
Kale is a fast growing crop which will thrive well when provided with plenty of organic material like slurry or FYM. For a soil index of 2 apply 100 units/ha each of P and K to the seedbed (see page 26).

Weeds, Diseases & Pest Control:
Several pre-emergence sprays are effective in kale and products are also available for post emergence control of broad-leaved weeds.

In dry years, flea beetles can cause considerable damage to young seedlings. Crops should be monitored regularly, we recommend using only seed treated with Cruiser. Slugs can be a problem in direct-drilled crops – slug pellets should be considered if appropriate. Rabbits and pigeons can also pose a threat and again some specific attempts at control may be necessary.

Clubroot represents the main disease threat, it is soil borne so control is by the use of good rotations. Try and avoid...
Variety Profiles

**KEEPER**  
Keeper is very winter hardy and exhibits good lodging resistance. Keeper is a medium/short type ideal for fattening lambs and providing high quality winter keep. It has low SMCO levels (anti nutritional chemical).  
Bred by

**GRAMPIAN**  
This is a variety bred in Scotland which will produce excellent autumn or winter feed for both sheep and dairy cows. Grampian exhibits very high dry matter yields combined with some club root resistance and can be used in out wintering systems.  
Bred by

**CALEDONIAN**  
Caledonian is the highest yielding kale in our trials. Caledonian is club root resistant, which now enables growers to continually sow kale on club root infected sites. Caledonian’s huge yields makes it ideal for utilisation by dairy and beef cattle.  
Bred by

**PINFOLD**  
Fast growing an ideal for early sowings. Pinfold will provide excellent yields in a short period of time.  
Bred by

Growing kale on any fields which have a history of clubroot, however the availability of the clubroot resistant variety Caledonian is a major breakthrough. Alternaria and mildew can affect crops but attacks are seldom too serious.

**Feeding:**  
The traditional method is to utilise the crop fresh either by strip or zero grazing. Strip grazing behind an electric fence which should be moved once or twice a day. Allow a space of 3 metres per cow and an area of grass for the animals to run back on.

Zero grazing – cutting the crop with a forage harvester – will help secure the maximum use of this excellent green feed with minimal waste. The kale can then be fed from a forage box or behind a barrier. Experts suggest that kale should provide no more than 30/35% of the daily dry matter intake for dairy cows.

Outerwintering – kale has been used very successfully in outwintering systems.

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**Crop Suitability**

- **GRAZE IN SITU** ✔️
- **DAIRY** ✔️
- **ZERO GRAZE** ✔️
- **BEEF** ✔️
- **ENSILE**
- **SHEEP** ✔️
- **LIFT & STORE**
- **PIGS**

**Trial Results**

<table>
<thead>
<tr>
<th>Variety</th>
<th>Type</th>
<th>Total Dry Matter Yield %</th>
<th>Total Fresh Yield %</th>
<th>Dry Matter %</th>
<th>Leaf: Stem Ratio</th>
<th>Height (cm)</th>
<th>Digestibility Value (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%=Tonnes/Ha</td>
<td></td>
<td>9.7</td>
<td>71.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Caledonian</td>
<td>Improved M/Stem</td>
<td>120</td>
<td>123</td>
<td>13.7</td>
<td>0.6</td>
<td>106</td>
<td>72.2</td>
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<tr>
<td>Grampian</td>
<td>Intermediate</td>
<td>115</td>
<td>115</td>
<td>14.0</td>
<td>0.7</td>
<td>102</td>
<td>75.3</td>
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<tr>
<td>Pinfold</td>
<td>Intermediate</td>
<td>111</td>
<td>99</td>
<td>15.6</td>
<td>1.0</td>
<td>102</td>
<td>71.7</td>
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<tr>
<td>Bittern</td>
<td>Intermediate</td>
<td>109</td>
<td>101</td>
<td>15.5</td>
<td>0.8</td>
<td>95</td>
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<tr>
<td>Voltage</td>
<td>Intermediate</td>
<td>107</td>
<td>96</td>
<td>15.5</td>
<td>1.0</td>
<td>96</td>
<td>71.0</td>
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<tr>
<td>Keeper</td>
<td>Short Grazer</td>
<td>102</td>
<td>90</td>
<td>15.7</td>
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<td>Maris Kestrel (c)</td>
<td>Short Grazer</td>
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<tr>
<td>Thousand Head</td>
<td>Older Standards</td>
<td>98</td>
<td>84</td>
<td>16.6</td>
<td>1.1</td>
<td>99</td>
<td>71.2</td>
</tr>
</tbody>
</table>

Data Source: Limagrain UK & James Hutton Institute trials 1991-2010  
Higher figure = more leaf

**Preferred Varieties**

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**Kale**

**VARIETY SELECTION GUIDE**

- **summer & autumn use**
  - sheep & cattle
- **winter use**
  - sheep
  - beef & dairy

Varieties:
- Pinfold
- Keeper
- Caledonian
- Grampian
**Stubble Turnip**

### Why grow stubble turnip?
- Fast growing catch crop
- Autumn or winter feed
- Finishing lambs
- Summer buffer feed for dairy cows
- Economical to grow
- Flexible sowing options
- Helps reduce winter feed costs

### Soil Type/Site Selection:
As most crops are grazed in situ a free draining light loam or brash with a pH of 6.5 is ideal.

### Seedbed & Sowing Methods:
If stubble turnips are to be sown after grass, a firm, fine seedbed will be required and traditional, plough-based cultivations will be fine. If stubble turnips are drilled following an arable crop, a cereal for example, then tined cultivations, discing or rotovation can often replace the plough. In all cases it is vital that soil moisture is not lost.

Stubble turnips should be sown approximately 12-14 weeks before they are to be utilised. If sown in April, after forage rye, Italian ryegrass or an early spring fallow, turnips are very useful for finishing off spring lambs or feeding other stock.

Stubble turnips also fit in well when sown in mid-June after an early hay/silage cut for autumn feeding but they are now increasingly being used for autumn sowing on cereal stubbles.

### Autumn sowings in the northern half of the country and on all uplands should be completed by the end of July. In the south, stubble turnips should be sown by mid-August with early September the latest date one should consider.

### Fertiliser:
An application of 80 kg of nitrogen, 25 kg of phosphate and 25 kgs of potash per ha is usually sufficient for this crop. Certainly, a dressing of between 60-90 kg of nitrogen/ha is especially important when the crop is being sown after a cereal. The fertiliser should be worked well into the seedbed. A top dressing of nitrogen (See Page 26) 3-4 weeks after sowing can boost crop growth.

### Feeding:
The stubble turnip crop is an attractive source of very palatable and easy to digest fodder. Both cattle and sheep should be introduced gradually to the crop and between grazings be able to run-back on grass or have access to grass silage. It is also advisable to have hay or straw on offer prior to each grazing particularly in the case of dairy cows. Allow stock about three weeks to fully adjust to stubble turnips so it is a good idea to introduce animals to the crop gradually.

### Sowing Information
- **Sowing period**
  1. May to June
  2. July to August
- **Direct drill**
  5 kg/ha [2 kg/acre] Natural seed
- **Broadcast**
  8 kg/ha [3 kg/acre] Natural seed

### Yield & Feed Quality
- **Average dry matter yield**
  3.5-5.0 tonnes/ha
- **Average fresh yields**
  38-45 tonnes/ha
- **Dry matter**
  8-9%
- **Crude protein**
  17-18% [mainly leaves]
- **Digestibility value**
  68-70D
- **Metabolisable energy**
  11 MJ/kg DM

### Growing Costs
- £305 per hectare
- Fresh weight £5 per tonne
- Dry matter £66 per tonne

For crops drilled into broken stubbles sowing rates will vary from 4.5-6.0 kg/ha depending on soil conditions and time of drilling.

Seed which is broadcast should go in at not less than 7-8 kilos/ha.

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As most crops are grazed in situ a free draining light loam or brash with a pH of 6.5 is ideal.

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Variety Profiles

SAMSON (Tetraploid)
Samson can produce huge tankard shaped purple roots which are very palatable to both sheep and cattle. In trials Samson has shown to be preferentially grazed which can lead to higher intake and live weight gains.

RONDO
Rondo is a green skinned variety, suitable for sheep or cattle. It has a very leafy growth habit, with excellent disease resistance and can be utilised from September to early February. Rondo has excellent root anchorage which helps reduce wastage in the field.

DELILAH
This exciting recent introduction which has out-performed many existing varieties in our trials for a number of years. Delilah is ideal for fattening lambs and will produce huge white tankard shaped bulbs. Good resistant to mildew.

TYFON (hybrid)
Tyfon is ideally sown in the spring and utilised in the summer months when grass growth generally declines. Tyfon should not be sown too early as it is susceptible to bolting. Tyfon’s growth habit is very leafy with regrowth potential.

Throughout the grazing period adequate mineral supplements should be fed to all stock.

Although the DM content of both the root and the leaf is low the quality of this DM is very good.

Livestock Intake:
A dairy cow will eat approximately 22 kg in a 2-3 hour grazing period and a lowland ewe about half that amount in a day. So an average autumn crop of 40 tonnes/ha (after allowing for wastage) should provide one days grazing for 500 cows or 1000 ewes. With beef animals an intake of 25 kg/head/day should give liveweight gains in the order of 0.5 to 0.75 kg/head. As a precaution against taint, dairy cows should be fed stubble turnips immediately after milking – and remove them from the crop at least three hours before the next milking. Cattle should strip graze the crop behind an electric fence to reduce wastage. With sheep good quality netting can be used to achieve the same aim.

Trial Results

<table>
<thead>
<tr>
<th>Variety</th>
<th>Type</th>
<th>Total Dry Matter Yield %</th>
<th>Total Fresh Yield %</th>
<th>Root Dry Matter Yield %</th>
<th>Leaf Dry Matter Yield %</th>
<th>Mildew Resistance 9=B</th>
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</thead>
<tbody>
<tr>
<td>100%=Tonnes/Ha</td>
<td></td>
<td>5.0</td>
<td>48</td>
<td></td>
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<tr>
<td>Delilah</td>
<td>Tankard</td>
<td>102</td>
<td>106</td>
<td>131</td>
<td>80</td>
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<tr>
<td>Barkant (c)</td>
<td>Tankard</td>
<td>100</td>
<td>100</td>
<td>100</td>
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<tr>
<td>Samson (Tet)</td>
<td>Tankard</td>
<td>99</td>
<td>107</td>
<td>120</td>
<td>85</td>
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<tr>
<td>Rondo</td>
<td>Leafy</td>
<td>87</td>
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<tr>
<td>Dynamo</td>
<td>Round</td>
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<td>(78)</td>
<td>(64)</td>
<td>(63)</td>
<td>(94)</td>
<td>(*)</td>
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<tr>
<td>Tyfon (Hybrid)</td>
<td>Leafy</td>
<td>78</td>
<td>75</td>
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<td>4.4</td>
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<td>Appin</td>
<td>Leafy</td>
<td>72</td>
<td>78</td>
<td>52</td>
<td>92</td>
<td>6.9</td>
</tr>
</tbody>
</table>

Data Source: Limagrain UK trials 1987-2011 (*No data available)

Preferred Varieties

Crop Suitability

- GRAZE IN SITU ✔
- DAIRY ✔
- ZERO GRAZE
- BEEF ✔
- ENSILE
- SHEEP ✔
- LIFT & STORE
- PIGS ✔

Stubble Turnip

VARIETY SELECTION GUIDE

- summer with regrowth
- autumn
- winter

Tyfon (hybrid)
Delilah
Samson
Rondo
Why grow forage rape?

- Fast growing leafy catch crop
- High protein content
- Longer lasting than stubble turnips
- Winter hardy hybrids available
- Fattening lambs
- Flexible sowing period
- Sheep, Dairy or Beef production

Forage Rape and Hybrids

Soil Type/Site Selection:
As most crops are grazed in situ a free draining light loam with a pH of 6-6.5 is ideal. Forage rape has a very vigorous growth habit and is very often used in upland reclamation projects where its ability to survive and grow on relatively poor soils and exposed sites is well known.

Seedbed & Sowing Methods:
Forage rape makes an excellent break crop between grass leys, if this rotation is used a firm, fine seedbed is required. Forage rape can also be sown after cereal harvest where tined cultivations, discing or rotavation will suffice.

Whichever method you choose, rolling after sowing will consolidate the seedbed and help reduce moisture loss. Seed should be drilled at 6 kg per ha or broadcast at 8-10 kg per ha.

Fertiliser:
Forage rape will benefit from applications of FYM or slurry before sowing. If this is unavailable then 60-90kg of Nitrogen, 25kg P & 25kg K per hectare into the seedbed should be sufficient for the crop. If the crop looks ‘hungry’ after 4-5 weeks from sowing then a top dressing of 75 kg per ha of nitrogen can be applied. High application of N can be detrimental to stock intakes (see page 26).

Sowing period
May to end August
Direct drill
6 kg/ha (2.5kg/acre) Natural seed
Broadcast
8-10kg/ha (4kg/acre) Natural seed

Average dry matter yield
3.5-4.0 tonnes/ha
Average fresh yields
24-35 tonnes/ha
Dry matter 11-12%
Crude protein 19-20%
Digestibility value 65D
Metabolisable energy
10-11 MJ/kg DM

£408 per hectare
Fresh weight £12 per tonne
Dry matter £107 per tonne
**Variety Profiles**

**INTERVAL** Rape/Kale Hybrid

When it comes to filling the gap in your winter feed programme, Interval rape/kale hybrid can really boost your profits. Interval’s exceptional yield potential, disease resistance and palatability is ideal for fattening lambs or dairy cows. Interval is very fast to establish with some crops ready to utilise within 10-12 weeks from sowing.

Bred by Limagrain and fully proven on livestock farms throughout the UK.

**HOBSON**

Hobson is the variety for finishing lambs. Hobson has excellent resistance to powdery mildew, a disease which can make some crops unpalatable leading to a high wastage factor. Hobson is very palatable and digestible. Bred by Limagrain and fully proven on livestock farms throughout the UK.

**HUNGRY GAP**

For later use Hungry Gap’s exceptional winter hardiness will ensure crops can be used in January and February. It is best sown in June or July and its growth habit is kale like in appearance.

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**Feeding:**

Forage rape crops can be ready to utilise between 13-15 weeks from sowing. They are ideally used for fattening lambs or flushing ewes and can be lightly grazed by cattle. As with any brassica crop, feeding should be introduced gradually over a 2-week period. Ideally there should be an area of grassland to allow stock to ‘run back’ onto along with access to hay or straw and water.

Forage rape is also the ideal companion to stubble turnips, the two sown together can be fed successfully with the forage rape adding extra crude protein content and winter hardness.

Many farmers have successfully mixed approximately 250-500g of forage rape seed into their grass seed mixtures, allowing them to be grazed while the young grass seedlings continue to establish underneath.

Forage rape can also be mixed with Italian ryegrass to create a cleaner autumn keep.

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**Trial Results**

<table>
<thead>
<tr>
<th>Variety</th>
<th>Total Dry Matter Yield %</th>
<th>Total Fresh Yield %</th>
<th>Dry Matter %</th>
<th>Powdery Mildew Resistance 9 = best</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% + Tonnes/ha</td>
<td>3.8</td>
<td>28.9</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Interval (Hybrid)</td>
<td>106</td>
<td>119</td>
<td>10.7</td>
<td>8</td>
</tr>
<tr>
<td>Hobson (c)</td>
<td>100</td>
<td>100</td>
<td>11.9</td>
<td>8</td>
</tr>
<tr>
<td>Swift (Hybrid)</td>
<td>99</td>
<td>114</td>
<td>10.8</td>
<td>*</td>
</tr>
<tr>
<td>Emerald</td>
<td>93</td>
<td>97</td>
<td>11.6</td>
<td>7</td>
</tr>
<tr>
<td>Stego</td>
<td>91</td>
<td>92</td>
<td>11.9</td>
<td>*</td>
</tr>
<tr>
<td>Winfred</td>
<td>86</td>
<td>87</td>
<td>11.9</td>
<td>*</td>
</tr>
<tr>
<td>Redstart (Hybrid)</td>
<td>84</td>
<td>86</td>
<td>11.4</td>
<td>*</td>
</tr>
<tr>
<td>Pasja</td>
<td>63</td>
<td>73</td>
<td>10.7</td>
<td>*</td>
</tr>
</tbody>
</table>

Data Source: Limagrain UK trials 1990-2011 (2 year data) *No data available

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**Crop Suitability**

- GRAZE IN SITU
- DAIRY
- ZERO GRAZE
- BEEF
- SILE
- SHEEP
- LIFT & STORE
- PIGS

---

**Forage Rape**

**VARIETY SELECTION GUIDE**

- summer/autumn
- winter
- late winter

- Interval (hybrid)
- Hobson (hybrid)
- Hungry Gap
Why grow swedes?

- Excellent high energy winter feed
- Low production costs
- Finishing lambs or winter maintenance
- High dry matter yields
- Cost effective (even where yields are only moderate)

Swedes

Soil Type/Site Selection:
The crop can be grown on a wide range of soils including sandy loams, silts, peat or clay loams. The desirable soil properties needed are – ease of working, good aeration, good structure and sound drainage. Avoid soils with pans and ensure a pH of around 6.5

Seedbed & Growing Methods:
The majority of swede crops are now sown with precision drills which require a level seedbed. Early drilling in April should be made with minimal cultivation passes to reduce compaction. Later drillings in May/June are often made in hot, dry conditions so try and undertake the seedbed cultivations in early spring to reduce soil moisture loss. Weeds should be eliminated between seedbed preparation and sowing.

Seed should be sown at 1-2cm depth and left well firmed on the top.

Precision or space drills are capable of accurate placement of individual seeds (e.g. Stanhay Webb). Swede seeds are naturally spherical, however, they are graded in size using a nationally agreed code letter system of ‘H’ (1.75mm-2.00mm).

Fertiliser:
Fertiliser should be applied into the seedbed. Swedes are responsive to Boron which should be applied to soils with a deficiency (see page 26).

Weeds, Diseases & Pest Control:
There are a number of pests which attack the swede crop from sowing through to maturity. In order to maximise crop establishment and minimise crop damage it is advisable to sow treated seed. If swedes are sown for culinary use it is essential that superficial mining or tunnelling from cabbage root fly be controlled, as is the internal damage from turnip root fly.

Rows should be 38-42cm apart. The ideal spacing within the row is generally assumed to be 15cm. Spacings for varieties may vary to achieve the ideal marketable size of the roots. The closer the spacing the smaller the bulb and later harvesting can be delayed without the roots becoming too large.

Early varieties (low DM) can be sown from early April to late May. The varieties for utilisation in late winter should be sown mid-April to mid-June.

Yield & Feed Quality:

<table>
<thead>
<tr>
<th>Average dry matter yield</th>
<th>7-10 tonnes/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average fresh yield</td>
<td>70-90 tonnes/ha</td>
</tr>
<tr>
<td>Dry matter 10-13%</td>
<td></td>
</tr>
<tr>
<td>Crude protein 10-11%</td>
<td></td>
</tr>
<tr>
<td>Digestibility value 82D</td>
<td></td>
</tr>
<tr>
<td>Metabolisable energy</td>
<td>12.8-13.1 MJ/kg DM</td>
</tr>
</tbody>
</table>

Growing Costs:

- £403 per hectare
- Fresh weight £5 per tonne
- Dry matter £62 per tonne

Sowing Information:

<table>
<thead>
<tr>
<th>Sowing period</th>
<th>April-June</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precision drill</td>
<td>350g-850g /ha [150g-350g / acre]</td>
</tr>
<tr>
<td>Grade H</td>
<td></td>
</tr>
<tr>
<td>Direct drill</td>
<td>3 kg/ha [1 kg/acre] Natural seed</td>
</tr>
<tr>
<td>Broadcast</td>
<td>5 kg/ha [2 kg/acre] Natural seed</td>
</tr>
</tbody>
</table>
**LOMOND**
High fresh and dry yields make this variety ideal for fattening lambs post Christmas. Lomond has both powdery mildew and club root resistance and trials show it suffers less from rots and splits in its root.

**INVITATION**
Invitation is a very uniform, club root resistant variety, ideal for utilisation after Christmas. Invitation also has excellent resistance to powdery mildew and will produce large leaves for extra grazing potential. Invitation is winter hardy and is suitable for sheep or cattle.

**BRORA**
A good looking deep purple skinned variety, Brora can be grazed early in the autumn or used for the prepack market as an early harvested crop. Brora has a high marketable yield and is fully tried and tested in the UK. Brora has low resistance to powdery mildew.

**GOWRIE**
This is a variety bred in Scotland. Gowrie is a variety that can be utilised pre or post Christmas. It can produce high dry matter yields and exhibits good resistance to both club root and powdery mildew.

The major disease to watch for is clubroot which affects the root system – the misshapen roots can be completely unsaleable in culinary situations.

Attacks of mildew on the leaves will reduce yield and may affect the crops palatability during in situ grazing.

**Feeding:**
Most fodder swede crops are grazed in situ. However, it is important to remember to select a variety (or varieties) to cover the period you wish to graze. It is advisable to use an electric fence to reduce wastage. Forage swedes can be lifted and the roots stored in a clamp. The roots need to be clean and free of soil and try not to store any damaged roots as this will encourage fungal diseases.

### Trial Results

<table>
<thead>
<tr>
<th>Variety</th>
<th>Type</th>
<th>Total Dry Matter Yield %</th>
<th>Total Fresh Yield %</th>
<th>Dry Matter %</th>
<th>Mildew Resistance</th>
<th>Root Shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%+Tons/hectare</td>
<td></td>
<td>9.78</td>
<td>89.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gowrie</td>
<td>Dual Purpose</td>
<td>118</td>
<td>119</td>
<td>11.0</td>
<td>9</td>
<td>7</td>
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<tr>
<td>Lomond</td>
<td>Dual Purpose</td>
<td>111</td>
<td>109</td>
<td>11.3</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>Ruby</td>
<td>Forage</td>
<td>107</td>
<td>102</td>
<td>11.7</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Invitation</td>
<td>Forage</td>
<td>106</td>
<td>94</td>
<td>12.6</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Brora</td>
<td>Culinary</td>
<td>100</td>
<td>106</td>
<td>10.4</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Ruta Otofte (s)</td>
<td>Forage</td>
<td>100</td>
<td>100</td>
<td>11.6</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Magres</td>
<td>Culinary</td>
<td>100</td>
<td>93</td>
<td>12.2</td>
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<td>6</td>
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<tr>
<td>Helenor</td>
<td>Culinary</td>
<td>96</td>
<td>93</td>
<td>11.6</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Marian</td>
<td>Dual Purpose</td>
<td>96</td>
<td>97</td>
<td>11.0</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

Data Source: Limagrain UK trials and James Hutton Institute 1990-2010

### Preferred Varieties

- **Gowrie**
- **Brora**
- **Lomond**
- **Invitation**
Forage Maize

Why grow forage maize?
- Relatively low production cost
- A single cut harvest
- High DM value
- Extra energy
- Increased forage intake
- Higher profits
- Consistent Forage quality

Soil Type/Site Selection:
The limiting factor with maize is the number of heat units available to mature the crop. Consequently, fields should face south, if possible, and growers should avoid high altitude sites. As a general rule 200 metres above sea level is the cut off point but higher altitudes have been successful in otherwise favourable locations. Select light, drier soil types – avoid heavy, poorly drained fields especially those with frost pockets or a heavy weed problem. Good access for heavy machinery is vital.

Seedbed & Sowing Methods:
Ideally, plough in the autumn and sub soil to improve structure. Avoid soil compaction at all costs. The crop requires a firm, fine tilth and try to retain loose soil moisture when preparing the seedbed in the spring. With maize it is important not to drill too early. The soil temperature needs to have stabilised at about 10°C which will normally equate to a sowing window between mid-April to mid-May.

Weeds, Diseases & Pest Control:
There are a number of pests and diseases which can attack a maize crop. Our very comprehensive technical guide to forage maize provides very detailed information on all aspects of this subject. Please telephone or e-mail us for a copy today.

Harvesting:
Clearly, the start of the forage maize harvest depends on the geographic area. The individual varieties and the site selected will both influence the harvest date. Harvest dates will vary, depending on the growing conditions, the site’s potential and the variety chosen. Harvesting should take place when the whole plant DM is between 30-35%, normally mid September - mid October. Harvesting is usually undertaken by a contractor.

Optimum cutting height is about 20cms from the ground and the silage should be chopped to commensurate with obtaining a reasonable consolidation in the clamp.

The final stage of the process – the filling and sealing of the clamp – is absolutely critical.

Roll the clamp continually and then seal it as quickly as possible. Make sure the clamp is properly consolidated using a heavy tractor and that the covering sheet is properly weighted down.

Feeding:
Almost any feeding system can be adapted so that maize can be added to the ration. Increasing the level of maize in a ration will raise the DM intake.

The basic rules when feeding maize are to introduce the crop gradually into the ration, ensure that there is sufficient long fibre, keep the silage face tight and avoid overheating. The key nutrient for which maize is grown is starch and maize starch is more slowly degradable than most forms, which makes it ideal for feeding to high yielding dairy cows. Fresh calvers and high yielders make the best use of maize and the crop is ideal for both growing and finishing cattle.

Yield & Feed Quality
- Average dry matter yield 15-18 tonnes/ha
- Average fresh yield 45-54 tonnes/ha
- Dry matter 30-35%
- Crude protein 9.5%
- Digestibility value 75D
- Metabolisable energy 11.5 MJ/kg DM

Growing Costs
- £1155 per hectare
  - Fresh weight £28 per tonne
  - Dry matter £100 per tonne

Sowing Information
- Sowing period
  - Mid April to mid May
- Precision drill only
- 106,000 seeds/ha
- 42,000-50,000 seeds/acre
Providing your farm is in a suitable location there are several key reasons why maize should be included in your home-grown forage cropping programme. They include:

**Relatively low production cost**
Maize has a relatively low cost of production (per tonne of DM) compared to other forage crops - such as a medium term grass ley cut for silage.

**Utilisation of organic manure**
A field earmarked for maize can provide an excellent home for FYM or slurry. This reduces the cost of growing the crop.

**A single cut harvest**
A well-grown crop of maize should yield between 15-18 tonnes of DM/ha and this will be achieved in one convenient cutting operation usually between mid September and mid October.

**High DM value**
In an average season and when grown in a suitable location your crop of forage maize should have a DM value of around 32-35%. The loss of effluent should be minimal with a well-made crop.

**Extra energy**
Under UK conditions forage maize crops should have an ME of around 11.5 MJ/kg DM. The big advantage is that much of the energy is stored in the grain in the form of starch - which is highly digestible.

**Increased forage intake**
When you first introduce maize into the diet you will notice very quickly that the crop encourages a significant increase in forage intake. The fact that maize is extremely palatable - as well as highly digestible - helps to account for this.

**Consistent forage quality**
Compared to a clamp of grass silage your stock of maize silage will have a very consistent quality from opening the face to finishing it. It is the single harvest operation that helps achieve this consistency - along with the relatively stable quality retained in the field over several weeks.

**Higher profits**
At the end of the day you grow maize because you want to improve and enhance your profitability. Maize achieves this by combining a high yield with excellent feed quality and top class intake characteristics. This, in turn, means cheaper production of meat and milk.

Fodder beet not only has one of the highest energy levels but also has the potential to produce more dry matter yield per hectare than any other forage crop. In terms of total energy production per hectare only forage maize comes close to the performance of fodder beet.

Many farmers have already recognised the benefits of feeding fodder beet but are restricted by traditional storage methods to only use fodder beet for part of the year.

However this doesn’t have to be the case. Co-ensiling fodder beet with maize produces an energy rich feed that can be used all year round.

Contamination with soil and stones is to be avoided so the technique is not suitable for very heavy clay soils, unless the beet can be washed.

Why ensile fodder beet and maize together?
- Possible to feed all year round
- Increased energy concentration in feed
- Significantly increases the dry matter intake of forage
- Reduced dependence on cereals and concentrates
- Stable and uniform feed throughout the year
- Reduced ensiling costs as harvest and silage making performed in one operation
- Reduced feed delivery cost as no daily chopping or cleaning required

If you would like further information about Beta Maize please contact us for a full technical sheet.
Forage Rye

Why grow forage rye?

- Early turnout (reducing overwintering costs) for cows
- Winter sheep keep
- Flexible sowing options after maize or cereals
- Zero grazing and Big bale options
- Helps mop up residual nitrogen and prevents soil erosion

Soil Type/Site Selection:
As forage rye is primarily grown for its ability to deliver very early grazing in the early spring it is essential to make sure that the right field is selected. A weed-free sheltered, well-drained field is ideal and if it has a southerly facing aspect then even better. Although forage rye will grow on a very wide range of soil types it is best to avoid very exposed or badly drained fields.

Seedbed & Sowing Methods:
The seedbed for the forage rye should be reasonably firm and well consolidated. A seed rate of between 160-185 kg/ha (65-75 kg/acre) is adequate under most circumstances and the seed should be drilled to a depth of 3.5-5.0 cm.

Cross drilling the forage rye usually helps to promote a thicker stand and direct drilling is an option if required. Direct drilling will eliminate soil disturbance and will give a much firmer footing for the stock in the spring.

Forage rye is a catch crop so it can slot in between say a cereal crop and then be followed by a crop of forage peas, fodder beet or kale.

Drilling date can vary with the locality but in general aim to get the seed in the ground between mid-August and late September. This ensures that the crop gets well established before the winter sets in.

Some farmers mix Italian ryegrass with their forage rye so that the spring grazing programme can be prolonged. If you adopt this option use a sowing rate of 17kg/125kg/ha respectively. Some farmers have also direct drilled forage rye into a permanent pasture. However you use forage rye it will enable you to squeeze extra production out of your land.

Weeds, Diseases & Pest Control:
No herbicides should be needed and the crop suffers from few pests and diseases. Any leatherjackets, wireworms or slugs which are seen should of course be controlled using the appropriate chemical.

Feeding:
Forage rye should not be allowed to enter the winter in a very proud state and in a mild autumn, crops sown in good time can be lightly grazed in late November or early December. Providing the grazing is not too severe this operation (carried out when the crop has around 10/12 cm of growth) will

Average dry matter yield
5-6 tonnes/ha

Average fresh yields
20-24 tonnes/ha

Dry matter 25%
Crude protein 11-12%

Digestibility value 67D
Metabolisable energy
10M/kg DM

Growing Costs
£339 per hectare
Fresh weight £12 per tonne
Dry matter £78 per tonne
encourage tillering, increase winter hardiness and boost the amount of green matter produced in the spring.

If you are grazing dairy cows on forage rye then the crop length needs to be about 30-35cm. For sheep the crop can be a little shorter.

If you graze early enough then you may well get a second flush of growth before you need to plough out the field for the following crop.

Controlled grazing, using an electric fence is very important to avoid excessive wastage.

Another option which some farmers exploit is to zero graze the crop. This avoids having to take the stock onto the field – which in wet weather can help reduce poaching.

To help you plan your feed requirements you should work on the basis that one hectare has the potential to provide two weeks grazing for 25 cows or 50 lactating ewes.

**Crop Suitability**

- GRAZE IN SITU ✔
- DAIRY ✔
- ZERO GRAZE ✔
- BEEF ✔
- ENSILE ✔
- SHEEP ✔
- LIFT & STORE
- PIGS

Some crops can be grazed lightly, pre-Christmas to provide extra forage.

**Humbolt**

Humbolt was purpose bred to produce an “early bite”, in fact its spring growth can be up to three weeks earlier than Italian ryegrass. Humbolt’s excellent tillering capacity and early vegetative growth ensures maximum intakes and palatability. Humbolt has excellent winter hardiness and can recover quickly after grazing or cutting.

Humbolt is UK proven and can thrive on a wide range of soil types.

**Expert Advice**

Cutting a lush crop of Humbolt forage rye which was then conserved as big bale silage

Bred by [logo]
Forage Peas

Why grow forage peas?
- Very high protein content (18-20%)
- Easy to harvest using forage machinery
- Suitable for undersowing new grass leys
- Impressive field performance
- Organic situations
- Some nitrogen fixation to enhance soil and next crop
- Excellent break crop

Soil Type/Site Selection:
Generally speaking forage peas can be grown on a very wide range of soils – fields need to be very well drained (peas do not like ‘wet feet’) and have a pH of 6.0 or above.

Seedbed & Sowing Methods:
Sowing date is somewhat flexible as it depends on where the crop is to fit in the rotation. It can be sown as early as March/early April in the south and a little later in the north. The minimum (stable) soil tolerance temperature required is 8°C. Bear in mind that late sowings (after mid summer) are unlikely to yield as well as early crops.

Fertiliser:
Forage peas are leguminous so will fix their own nitrogen. However, a small dressing of nitrogen will often be beneficial at the establishment phase depending on the existing nutrient status of the soil.

Weeds, Diseases & Pest Control:
In good conditions forage peas will produce a dense canopy which will smother weeds very efficiently. However, it is good husbandry to ensure that the field is as weed free as possible from the outset.

Bird damage (mainly pigeons and rooks) can be substantial where fields are in a high-risk area. Damage will be minimised by the speedy establishment of the crop so sowing into optimum seedbed conditions is vital. The use of bird scaring devices may well be essential on sites prone to bird strikes.

Harvesting:
Forage peas can be cut and clamped, cut and baled or grazed in situ. For crops destined for cutting the peas should be harvested when they are still flowering and the plants have formed but not filled their first pods. Wilting for 24/48 hours is recommended and precision chopping is essential. The use of an appropriate additive is a very sound move to help ensure a good fermentation in the clamp or the bale.

Generally speaking, silage made from a mixture of peas and cereals will be less prone to poor preservation – the disadvantage is that such a mixture is more likely to deteriorate faster at the silo face during feeding. This will certainly be the case if the material has not been chopped very short or consolidated efficiently.

A good crop of forage peas will yield between 40-50 tonnes of green matter per ha (at 20% DM) and this is, of course, achieved with a single cut.
If you plan to strip graze your crop then make sure the whole process is controlled by an electric fence to reduce wastage and control intake.

**Feeding:**

Although some experts believe that forage peas are a ‘bloat free’ crop (due to their content of tannin) it will be sensible to introduce stock to the crop gradually and, for safety, it is important to monitor animals regularly while they are grazing.

Like all legumes, forage peas are very palatable and their judicious use in the diet should promote a higher voluntary intake.

**HARVESTING STAGES OF FORAGE PEAS**

- Sowing
- Flowering
- Mangle Toot
- Green Pea
- Soft Rubbery
- Hard Rubbery
- Hard Dried Pea
- Arable Silage
- Wholecrop
- Combining Peas

Always use the first truss to make your harvest assessment.

**ARABLE SILAGE MIXTURES**

These mixtures contain different combinations of both cereals and peas that can provide a valuable source of protein and starch. The ensiled crop can provide excellent winter feed rations for dairy, beef and sheep.

The crop can produce excellent yields from a short growing period of approximately 13 –16 weeks. The silage combines high intake potential and can be used as part of a mixed forage diet. The pea content of these mixtures can help increase the protein content. Arable silage mixtures can be under sown with a new grass ley to further maximise the use of your land.

**Profile**

A proven blend of Forage peas Magnus and Spring barley which can produce a quality silage high in protein content.

Contains: 60% Magnus pea 40% Spring barley

**Protein Plus**

A traditional blend of Spring oats, barley and Magnus forage pea

Ideally suited for use in a mixed forage diet.

Contains: 35% Spring oats, 40% Spring barley, 25% Magnus forage pea

Sow at 125-150 kilos per hectare - under sown with grass

175-200 kilos per hectare - for best results

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**Crop Suitability**

- Graze in situ ✔
- Dairy ✔
- Zero Graze ✔
- Beef ✔
- Ensile ✔
- Sheep ✔
- Lift & Store
- Pigs

**Expert Advice**

Magnus can be under sown with a grass ley; this can greatly reduce the period of time a new ley is out of production.
Why grow lucerne?
- High protein forage
- Drought tolerant
- Four cuts per year possible
- 3-5 year potential
- Clamp big bale or hay
- Nitrogen benefit for subsequent crop
- Can be dried and pelleted

Soil Type/Site Selection:
Lucerne can be grown on a wide variety of sites and soil types. The main criteria is to establish on a site where a fine and firm seedbed can be established. Lucerne will not in general tolerate a waterlogged soil and this is commonly the cause of die out over winter. For this reason heavy sites tend to be avoided. Well draining heavier soils however can provide very successful sites where good seedbeds can be established and compaction is avoided.

Sowing Date:
Lucerne can be sown from April right through the spring and summer. Sowings in the late summer will result in heavier crops in the following spring. However, the later sowings carry a greater risk of establishment failure due to the onset of cooler growing conditions in the autumn. Failure to enter the winter with strong plants is likely to result in excess winterkill. For this reason crops in the Midlands and further North are better sown in the spring. Crops in the Southern half of England however can be established with great benefit in the summer. The latest safe sowing date should be considered to be 1st September. Remember sufficient soil moisture is essential for generating successful establishment and this can be a problem with summer sowings.

pH:
Lucerne is one of the few crops which will thrive on a soil with a high pH. Adequate lime levels are essential for a successful crop and limiting to pH 7 is advised. Acidity will not be tolerated.

Fertiliser:
In general Lucerne requires no nitrogen either in the establishment or subsequently. Lucerne is a legume and as such is able by association with bacteria to fix nitrogen into the soil for its own use. It will leave residual nitrogen for use by subsequent crops. However if the Lucerne is following a particularly nitrogen hungry rotation (e.g. cereals) a small quantity of nitrogen may be beneficial in the seedbed (50kg/Ha maximum). If slurry is applied before drilling this usually provides sufficient nitrogen in organic form. Excess nitrogen application will inhibit root nodulation and reduce the Lucerne’s ability to fix nitrogen into the soil.

A strongly growing crop of Lucerne will remove approximately 150kg/ha Phosphate and Potash annually. This should be replaced to maintain soil levels by smaller applications after each cut or a single application after the last cut of the summer. Apply fertiliser immediately after cutting to avoid leaf scorch on the new leaf growth.

All fertiliser should be applied according to requirements based upon soil analysis prior to sowing. Trace elements may be deficient on light soils and attention should be paid to the availability of MAGNESIUM, SULPHUR, MOLYBDENUM, and BORON. These can be particularly important at the establishment phase.
## Variety Profiles

### MARSHALL
This variety can produce very high dry matter yields. The variety is well adapted to UK conditions and can be harvested for either silage or Hay. Marshall has thinner stems and is therefore very palatable.

### ALICIA
Alicia is a high yielding variety. Ideal for silage or Haylage production. Very high protein content (17%) and good ground cover makes this variety an ideal choice.

---

### Weed Control:
Lucerne is a very uncompetitive crop in its early growth stages. It will not tolerate weeds and control is essential if infestation is serious.

Summer sowings are likely to have less weed competition than sowings in spring. They also enable cheaper sterile seedbed techniques to be used.

Light infestations are likely to be removed in the first cut and smothered by the regrowth. This however is very dependent upon successful initial population establishment.

Approved chemicals for use on Lucerne are limited and advice should be sought upon those with clearance for use.

Perennial weeds should be controlled as far in advance of the crop as possible.

---

### Pests and Diseases:
There are very few chemicals which can be used on Lucerne to control any pests or diseases. The problem is compounded by the inability to enter and travel through the crop once it is actively growing, unless tramlines are used at establishment.

**Weevils** - may attack at an early stage in establishment biting off young shoots. (Pyrethroids may be used).

**Aphids** - may infest later but no chemical approval exists for control at present.

**Slugs** - a potential problem at initial establishment. These should be monitored and slug pellets used where required.

**Eelworm** - (Ditylenchus dipsaci) can cause persistency problems and where infestations in the soil are known to occur, varietal resistance is the only practical solution. Eelworm is more prevalent of heavier soils.

Always use fumigated seed to avoid importing Eelworm to your soil and crop.

**Verticillium wilt** - There are no chemicals available for the control of this disease. Varietal resistance is the only option.

---

### Rotation:
For crop cleanliness purposes a rotation of 5 years is advised between Lucerne crops. Crops may be down for 3-5 years depending upon the durability of the stand.

### Harvest:
The first cut will usually be in late April/May depending upon season and location. The cutting cycle will usually be approximately 40 days and cuts should be taken at the set of the flower buds. Delaying cutting will result in lower quality more fibrous material being harvested and a lower feed value. Cutting pre-flowering will yield 20-22% protein. This reduces to 17-18% when cut once flowers have emerged.

Lucerne has low soluble carbohydrate levels and when ensiled this can lead to fermentation problems. A silage additive is therefore recommended to assist conservation preservation. Because of these difficulties ensiling as Big Bale often proves easier and more successful. If clamp silage is to be made then a good wilt is even more essential, raising the soluble carbohydrate concentration in the remaining sap.

Cut at about an 8cm stubble length the Lucerne should be swathed and wilted. Excess drying will result in loss of leaves and nothing but stalk will remain. Insufficient wilting may lead to effluent problems. A compromise may be reached by wilting until the material on the top of the swath is dry whilst that in the middle is still more green and moist. Bailing at this stage will conserve the valuable leaf material but minimise effluent.

Lucerne is not entirely suitable for grazing as treading causes excessive wastage and damages the plants too severely. Excess grazed intake can also cause bloat.

Light grazing is less likely to cause damage if practiced once the crop has stopped growing into the autumn.

Care should be exercised to avoid damaging the plant crown growing points as this can induce Lucerne crown rot. This disease can also be a problem if excess slurry is applied.

---

### Crop Suitability

<table>
<thead>
<tr>
<th>GRADE IN SITU</th>
<th>DAIRY</th>
<th>ZERO GRAZE</th>
<th>BEEF</th>
<th>PIGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

### Inoculation:
Treatment of Lucerne seed with Rhizobium bacteria is essential prior to sowing in order to ensure successful root nodulation and efficient nitrogen fixing. Inoculation is a simple process involving mixing the seed with a powder and water. The mixture is allowed to quickly dry before drilling.

**Sowing Rate/Depth:**
Sowing rates vary from 8-15 kgs per acre (20-37 kg/ha). Lucerne has very tiny seed and is best drilled at no more than 1cm depth. Drill into moisture in 10cm rows. Sowing too deep will result in failed emergence. Fine firm seedbeds are essential and rolling after drilling is advised. Broadcasting seed is an option and has the advantage of ensuring seed is not placed too deep.

### Phosphate (P₂O₅) kg/ha
- Establishment: 120
- First cut: 100
- Subsequent cuts: 100

### Potash (P₂O₅) kg/ha
- Establishment: 80
- First cut: 80
- Subsequent cuts: 80

### Expert Advice
Lucerne is best harvested at the set of the flowerbed.
Catch Crop Mixtures

Preferred Mixtures

Catch crop mixtures are becoming increasingly popular as a way of providing a balanced feed that can be grazed in situ. Most of these concepts involve the blending of catch crop species such as stubble turnips, forage rape and kale.

The high protein contents of both forage rape and kales complement the high energy stubble turnip bulbs and provide an excellent well balanced autumn or winter feed.

LAMB TONIC
1.00kg White Clover
0.50kg Plantain Tonic
2.50kg Chicory
4.00 kg per acre

A new concept developed in New Zealand. The crop can be sown in strips or added to grass leys will provide a nutritious leafy food with high mineral content.

This mixture is perennial and should last 3-4 years.

AUTUMN KEEP
1.00kg Forage Rape Hobson
0.50kg Stubble Turnip Samson
0.75kg Stubble Turnip Rondo
0.25kg Kale
2.50 kg per acre

Very fast establishment for autumn use. Autumn Keep will produce a quality crop with good disease resistance.

MEAT MAKER
1.30kg Forage Rape Hobson
0.50kg Stubble Turnip Rondo
0.20kg Kale
2.00 kg per acre

An excellent blend designed to produce autumn or winter keep from minimal effort.

The higher inclusion of forage rape helps to protect the turnips if crops are to be used later.

LATE LAMB
1.00kg Kale Rape Hybrid
1.00kg Stubble Turnip Rondo
5.00kg Italian Ryegrass
7.00 kg per acre

The inclusion of varieties with improved winter hardiness makes this mixture ideal for later use. Italian Ryegrass ensures the crop has improved density to help keep animals cleaner.

Sowing combinations of stubble turnip and forage rape has two benefits, it improves the protein content of the crop and secondly, forage rape improves winter hardiness and extends the utilisation period.
Chicory is a perennial forage herb and is capable of producing very high quality feed in early spring to late autumn. The plant needs approximately 14 - 16 weeks growth before full production is achieved. The plant will produce leafy top growth with a deep tap root that can stand drought and will even tolerate low Ph soils of 5.0.

**Why grow chicory?**
- Highly palatable
- Summer production
- Drought tolerant
- Quick recovery after grazing
- No bloat problems
- Grown on its own or mixed with a grass seed ley mixture
- Rich source of trace elements and minerals

**Variety Profile**
**CHICO**
Chico chicory is UK proven and has the ability to deliver high quality forage for finishing lambs. Chico Choice can also be mixed with Forage Plantain Tonic to help increase the Copper and selenium content (see page 20) Lamb tonic mixture.

**Soil type/Site selection:**
Chicory prefers well drained soils with moderate to high fertility. Ph should be above 5.5, however some crops have been grown successfully below 5.0.

**Seedbed and sowing methods:**
Chicory is best sown in the spring, into a firm, fine seedbed. The seed can be broadcast or drilled at 5 kilos per hectare (2 kilo per acre). Sowing depth is approx 1cm. Chicory can also be added to grass & clover seed mixtures at 1 kilo per acre. Slug pellets can be used to aid establishment.

**Fertiliser:**
Like any crop Chicory will benefit from some fertiliser applied into the seedbed. If you have done a recent soil test check the indices.
As a guideline apply phosphate at 20kg/ha Potash and nitrogen at 30kg/ha.

**Feeding:**
Chicory is dormant during the winter months but will grow quickly from April onwards. The crop is ready for grazing when it reaches a height of 8".
The crop is best rotationally grazed every 5-6 weeks to prevent the plants from flowering. Try not to graze after flowering or after wet conditions when the crowns are more susceptible to damage.

Graze the crop rotationally every 5-6 weeks to prevent the plants flowering.
Using the chart below you can easily introduce forage crops into your rotation.

Just look at the options in the column marked “what do you want to achieve”. For instance – Cereal to Grass, and then select the year 1 and 2 crop options. Forage crops provide a fantastic break crop and entry back into grass – it allows you to control any serious weed problems and will add back to your soil vital animal manures.

<table>
<thead>
<tr>
<th>What do you want to achieve?</th>
<th>Year 1 Crop suggestions</th>
<th>Year 2 Crop suggestions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPRING</strong></td>
<td>Spring barley</td>
<td>Stubble turnips</td>
</tr>
<tr>
<td><strong>AUTUMN/WINTER</strong></td>
<td>Forage maize</td>
<td>Feed wheat</td>
</tr>
<tr>
<td>CEREAL TO GRASS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIGH ENERGY</td>
<td>Fodder beet</td>
<td>Spring barley</td>
</tr>
<tr>
<td>PROFITABLE SHEEP</td>
<td>Swede</td>
<td>Forage Rape</td>
</tr>
<tr>
<td>PROTEIN BOOSTER</td>
<td>Arable silage</td>
<td></td>
</tr>
<tr>
<td>NEW GRASS</td>
<td>Worn out grass ley</td>
<td>Lucerne</td>
</tr>
<tr>
<td>(after 1st cut silage)</td>
<td></td>
<td>(sow no later than July)</td>
</tr>
<tr>
<td>MILK YIELDER</td>
<td>Maize</td>
<td>Forage rye</td>
</tr>
<tr>
<td>OUT-WINTERING</td>
<td>Fodder beet</td>
<td></td>
</tr>
<tr>
<td>GRASS REVIVER</td>
<td>Low yielding ley</td>
<td>Spring sown grass ley</td>
</tr>
<tr>
<td>TRIPLE CEREAL</td>
<td>Spring barley</td>
<td>Fodder beet</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kale</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stitch in Grass/Clover</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Revitalised grass</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Forage maize</td>
</tr>
</tbody>
</table>
Feeding Guidelines

Many of the Forages that appear in this booklet are grazed and utilised in the field (Grazed in Situ). To get the best from your crops a few simple steps can make all the difference in maximising animal performance and profitability.

The following are some of the key management tools you may consider:

- Recommended inclusion rates should be between 35 – 50% of total dry matter intake.
- Access to straw or hay as well as the forage brassica is important
- Ensure a good water supply
- Occasionally over feeding can cause Goitre and blood anaemia but access to straw and hay can help reduce this problem

Strip Grazing

- Using an electric fence will help reduce wastage in the field
- Long narrow strips are best to allow full animal access
- Introduce the animals to the crop slowly
- Move the electric fence daily if possible
- Providing a dry run back will keep the animals clean

The chart below will allow you to calculate how many grazing days each forage crop will provide:

---

**How much should I grow?**

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>AVERAGE FRESH YIELD</th>
<th>LESS WASTAGE FACTOR Grazing Wastage %</th>
<th>UTILISABLE YIELD</th>
<th>GRAZING DAYS PER HECTARE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tonnes per hectare</td>
<td></td>
<td>Tonnes per hectare</td>
<td>SHEEP RATION 7.5kg per day</td>
</tr>
<tr>
<td>KALE</td>
<td>60</td>
<td>25</td>
<td>45</td>
<td>6000</td>
</tr>
<tr>
<td>STUBBLE TURNIP</td>
<td>40</td>
<td>25</td>
<td>30</td>
<td>4000</td>
</tr>
<tr>
<td>FORAGE RAPSE</td>
<td>35</td>
<td>25</td>
<td>26.25</td>
<td>3500</td>
</tr>
<tr>
<td>SWIDEE</td>
<td>80</td>
<td>25</td>
<td>60</td>
<td>8000</td>
</tr>
<tr>
<td>FORAGE PEAS</td>
<td>35</td>
<td>20</td>
<td>28</td>
<td>3733</td>
</tr>
<tr>
<td>FORAGE RYE</td>
<td>20</td>
<td>15</td>
<td>17</td>
<td>2266</td>
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</table>
# Fertiliser Guidelines For Forage Crops

<table>
<thead>
<tr>
<th>Crop/Species</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>SNS Index</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<tbody>
<tr>
<td></td>
<td>Kilos per hectare</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Swede</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrogen (N)</td>
<td>100</td>
<td>80</td>
<td>60</td>
<td>40</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>Phosphate (P₂O₅)</td>
<td>105</td>
<td>75</td>
<td>45</td>
<td>0</td>
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<td>0</td>
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<tr>
<td>Potash (K₂O)</td>
<td>215</td>
<td>185</td>
<td>155 (2-)</td>
<td>125 (2+)</td>
<td>80</td>
<td>0</td>
<td>0</td>
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<tr>
<td><strong>Forage Rape and Stubble Turnips</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Nitrogen (N)</td>
<td>100</td>
<td>90</td>
<td>80</td>
<td>60</td>
<td>40</td>
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<td>0</td>
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<tr>
<td>Phosphate (P₂O₅)</td>
<td>85</td>
<td>55</td>
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<tr>
<td>Potash (K₂O)</td>
<td>110</td>
<td>80</td>
<td>50 (2-)</td>
<td>20 (2+)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Fodder Beet</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrogen (N)</td>
<td>130</td>
<td>120</td>
<td>110</td>
<td>90</td>
<td>60</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Phosphate (P₂O₅)</td>
<td>110</td>
<td>80</td>
<td>50</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Potash (K₂O)</td>
<td>170</td>
<td>140</td>
<td>110 (2-)</td>
<td>80 (2+)</td>
<td>40</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Kale</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrogen (N)</td>
<td>130</td>
<td>120</td>
<td>110</td>
<td>90</td>
<td>60</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Phosphate (P₂O₅)</td>
<td>110</td>
<td>80</td>
<td>50</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Potash (K₂O)</td>
<td>260</td>
<td>230</td>
<td>200 (2-)</td>
<td>170 (2+)</td>
<td>130</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Forage Rye</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrogen (N)</td>
<td>80</td>
<td>60</td>
<td>40</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Phosphate (P₂O₅)</td>
<td>95</td>
<td>65</td>
<td>35</td>
<td>0</td>
<td>0</td>
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<td>0</td>
</tr>
<tr>
<td>Potash (K₂O)</td>
<td>180</td>
<td>150</td>
<td>120 (2-)</td>
<td>90 (2+)</td>
<td>50</td>
<td>0</td>
<td>0</td>
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</tbody>
</table>

Extract from DEFRA fertiliser manual (RB209) version 8.
Below you will find a chart which summarises the forage crops featured in this guide, from sowing times and rates, growing costs yield and feed quality data. Use this guide to select the forage crop which best suits your system and objectives.

<table>
<thead>
<tr>
<th>Species</th>
<th>Sowing Time per hectare</th>
<th>Sowing Rate per hectare*</th>
<th>Growing Costs per hectare</th>
<th>Fresh Yield tonnes per hectare</th>
<th>Dry Matter tonnes per hectare</th>
<th>Crude Protein %</th>
<th>ME kg/DM</th>
<th>ME MJ per hectare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fodder Beet</td>
<td>March-April</td>
<td>100,000 seeds</td>
<td>£1,460</td>
<td>80-90</td>
<td>13-15</td>
<td>12-13</td>
<td>12.5-13.5</td>
<td>162,500-202,500</td>
</tr>
<tr>
<td>Kale</td>
<td>April-Early July</td>
<td>4-5 kgs</td>
<td>£496</td>
<td>80-65</td>
<td>8-10</td>
<td>16-17</td>
<td>10.0-11.0</td>
<td>80,000-110,000</td>
</tr>
<tr>
<td>Stubble Turnip</td>
<td>May-August</td>
<td>5-8 kgs</td>
<td>£305</td>
<td>38-45</td>
<td>3.5-5.0</td>
<td>17-18</td>
<td>11.0</td>
<td>38,500-44,000</td>
</tr>
<tr>
<td>Forage Rape</td>
<td>May-August</td>
<td>6-9 kgs</td>
<td>£408</td>
<td>24-35</td>
<td>3.5-4.0</td>
<td>19-20</td>
<td>10-11</td>
<td>35,000-49,500</td>
</tr>
<tr>
<td>Swedes</td>
<td>April-June</td>
<td>3-5 kgs Direct</td>
<td>£403</td>
<td>70-90</td>
<td>7-10</td>
<td>10-11</td>
<td>12.8-13.1</td>
<td>89,600-131,000</td>
</tr>
<tr>
<td>Lucerne ▲</td>
<td>April-August</td>
<td>30-35 kgs</td>
<td>£1,459</td>
<td>35-40s</td>
<td>10-12</td>
<td>17-22</td>
<td>10</td>
<td>100,000-120,000</td>
</tr>
<tr>
<td>Forage peas</td>
<td>March-Early June</td>
<td>125-150 kgs</td>
<td>£708</td>
<td>37-50</td>
<td>8-10</td>
<td>18-20</td>
<td>10.5</td>
<td>84,000-105,000</td>
</tr>
<tr>
<td>Forage Rye</td>
<td>Sept-October</td>
<td>185 kgs</td>
<td>£339</td>
<td>20-24</td>
<td>5-6</td>
<td>11-12</td>
<td>10</td>
<td>50,000-60,000</td>
</tr>
<tr>
<td>Forage Maize</td>
<td>April-May</td>
<td>100-110,000 seeds</td>
<td>£1,155</td>
<td>45-54</td>
<td>15-18</td>
<td>9.5</td>
<td>10.5-11.8</td>
<td>157,500-212,400</td>
</tr>
</tbody>
</table>

*Growing costs provided by Kingshay Farming Trust ▲ 3 cuts per year
Precision Drill Recommendations

### PRECISION DRILL RECOMMENDATIONS

<table>
<thead>
<tr>
<th>SEED GRADING</th>
<th>GRADE</th>
<th>SIZE (mm)</th>
<th>STANHAY BELT SIZE</th>
<th>SPRING BASE</th>
<th>CHOKE</th>
<th>WEBBS SELECTOR WHEEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fodder Beet Pelleted Mangel Pelleted</td>
<td>Q-U</td>
<td>3.50 - 4.75</td>
<td>15 or 16</td>
<td>C</td>
<td>A</td>
<td>EP</td>
</tr>
<tr>
<td>Mangel Rubbed and Graded</td>
<td>M-T</td>
<td>2.75 - 4.50</td>
<td>14 or 15</td>
<td>B</td>
<td>X</td>
<td>E</td>
</tr>
<tr>
<td>Swede</td>
<td>“H”</td>
<td>1.75 - 2.00</td>
<td>8</td>
<td>A</td>
<td>T</td>
<td>B</td>
</tr>
<tr>
<td>Turnip</td>
<td>“G”</td>
<td>1.50 - 1.75</td>
<td>7</td>
<td>A</td>
<td>T</td>
<td>A</td>
</tr>
<tr>
<td>Kale</td>
<td>“J”</td>
<td>2.00 - 2.25</td>
<td>8.5</td>
<td>A</td>
<td>T</td>
<td>C</td>
</tr>
</tbody>
</table>

### NUMBER OF SEEDS BY PACK SIZE SUPPLIED

<table>
<thead>
<tr>
<th>SWEDER</th>
<th>KALE</th>
<th>TURNIP</th>
<th>FODDER BEET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural seed packed in kilo packs (310,000 seeds approx.)</td>
<td>Natural seed packed in 1 kilo packs (150,000 seeds approx.)</td>
<td>Natural seed packed in 1 kilo packs (430,000 seeds approx.)</td>
<td>(Genetic monogerm) 1 acre (50,000 seeds)</td>
</tr>
<tr>
<td>Graded seed packed in 500 gm packs (150,000 seeds approx.)</td>
<td>Graded seed packed in 500 gm packs (75,000 seeds approx.)</td>
<td>Graded seed packed in 500 gm packs (220,000 seeds approx.)</td>
<td>Grade Q-U (3.50 - 4.75mm)</td>
</tr>
<tr>
<td>Grade ‘H’ (1.75 - 2.00mm) (Approx 300 - 370 seeds per gm)</td>
<td>Grade ‘J’ (2.00 - 2.25mm) (Approx 150 - 175 seeds per gm)</td>
<td>Grade “G” (1.50 - 1.75mm) (Approx 420 - 510 seeds per gm)</td>
<td></td>
</tr>
</tbody>
</table>
For technical advice and the name of your nearest LG stockist contact:

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