



# Camstar Herbs Ltd.

## Growers Information Document



[www.camstar.co.uk](http://www.camstar.co.uk)

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## Introduction

The Starke family, encompassing over four generations, have been producing and trading quality herbal products since 1899. Chestnuts Farm was acquired in 1925, over the years the product range and processing equipment has expanded and undertaken state of the art modernisation. Camstar Herbs is currently the largest producer and supplier of dried curled parsley in the world, with about 45% of this production going direct into the USA, Thailand, Australia and Brazil.

***'Camstar produce the finest quality herbs in terms of flavour and colour...  
Our herbs have the lowest final product bacterial counts due to our  
revolutionary in-line heat treatment system'***

As either an established grower (and we have some of 20 years) or a potential new grower this pack is designed to help you understand how you can contribute towards helping us achieve our aim and further develop our products to meet the requirements of our customers.

Cropping parsley will provide you with a profitable niche break crop, free from market forces such as wheat, barley, rape etc., you know at the outset what your crop should realise.

Furthermore, it will provide you with additional information on growing, harvesting, processing, chemicals, systems, rejections and payments.

This booklet will run through the possible weeds and the steps you need to take to protect your crop and make the best yield possible.

## Farm Assurance Certification

Camstar Herbs is farm and produce assured. It is an essential requirement, for us and our customers, that any grower is able to supply their farm assured certificate. In the UK, food assurance schemes help to provide consumers and businesses with guarantees that food has been produced to particular standards.

The food standards agency maintains close contact with assurance schemes because of their potential to promote farm practices that contribute to recommended policy. They also monitor whether communications and claims made by assurance schemes are accurate. Camstar pride themselves on maintaining an AA Grade from the British Retail Consortium.

It is the recommendation of Camstar that a farmer linked with Camstar has The NSF Certification for Fresh Produce but if you have the certification for crops, sugar and beet, we will require you to fill in the Grower additional questionnaire so that we can perform a gap analysis.

## Growing

Any information given below regarding growing is based on general guidelines, however, we recognise that each field differs and the process will of course need to be tailored to your specific situation and to ensure optimum yield delivery.

In the year prior to drilling the parsley seed it is advisable to spray glyphosate to ensure the land is clear of any annual and perennial weeds. Advice will be given early regarding phosphorus (P), potassium (K) and magnesium (Mg) applications depending on the analysis of the soil. Drilling usually takes place during March, avoid compaction of the land as this deters germination and later plant vigour. The proximity of the crop plants to each other will determine the competitiveness of the plant stand as a whole. Spatial distribution of the canopy foliage and rooting system will be important for weed suppression: the general principal being that the greater amount of space taken up by the crop, the less space there is for the weeds to invade. However, it should be borne in mind that closely spaced crops plants compete with each other and that it is also expedient to leave sufficient space between plants to allow for efficient yields. Row spacing will be discussed with you, and the most efficient practice will be agreed for your field. Our row spacing ranges from 8 inch to 15 inch but this is dependent on soil type, irrigation and the equipment available for drilling.



Following drilling a pre-emergence spray and fertiliser at 50 kg N/ha is applied. Germination of parsley is very slow, therefore, allowing time for a contact herbicide to be applied prior to emergence. A further application of fertiliser is applied at 100 kg/ha at first leaf. When the parsley has grown to

approximately 5 centimetres, rolling is required to help prevent stones coming into the processing plant. Another reason for rolling of the seedbed is that soil consists of 50% solid material with 50% pores. In the ideal case, half the pores are filled with water, half with air. This will vary in accordance to how much rain has fallen, the structure of the soil and how it was tilled.

This is a crucial stage for the following reasons:-

1. Too little reconsolidation, i.e. soil too loose around the seed, can prevent capillary transport of water because the pores are too large. This means that the soil around the seed becomes too dry, so the seed dries out and the seedling wilts.
2. Optimal reconsolidation provides good contact between seed and soil, so the seed is supplied with water through capillary transport. At the same time, there are large enough pores to transport oxygen.
3. Too much reconsolidation means in contrast that the large pores are compressed and become less effective as regards draining away excess water and transporting oxygen to and carbon dioxide from the seed. This can lead to oxygen deficiency, which kills the root.

Spray recommendations will be ongoing until the first cut which, depending on growth rates and weather conditions, usually happens during June - July. Inorganic Fertilisers will be recommended to be applied to the land to increase available nutrients. These will be either classified as straights or compounds.

Straights – Have a single chemical ingredient, therefore when applied to the land they will only supply that particular nutrient.

Compounds – When crops need more than one of the three main nutrients (N, P and K), therefore it's convenient to apply all the nutrients at the same time. Compound fertilisers are more expensive than straights but the extra cost can be justified if more than one nutrient is needed. The composition of a compound fertiliser is stated in the terms of a ratio N:P:K.

These will be advised by our agronomist Darryl Shailes.

All recommendations will be verbal and followed by an email stating dose and application. Please see over for an example.

Job 2 Total job area: 5.70 ha Growth Stage 33: 30% of width or height  
Reason:Disease and pests and minerals Comment:apply 7-10 days from last spray depending on risk Application:EAMU/SOLA growers risk

Fields	Job 2	Area ha	Crop	Variety	Field Comment	Date	Start	Finish	Wind		Weather / Temp	Operator	Buffer Zone (m)
									Speed	Direction			
		5.70	Parsley Leaf	Parsley									

Products Job 2		Application rate: 200 L		Rate / ha	Required	Units	% Rate	LERAP	Total Used
LERAP star rating: Standard	Spray quality: Medium fine								
Fubol Gold WG				1.900	10.830	kg	100	B	
HI: -14 Days 00 Hours MAPP:14605, Active Ingredients: Mancozeb 63.89%, Metalaxyl-M 3.99%, Expires:31/12/2019 EAMU:2285/13									
Eribea				0.125	0.713	L	100	*	
HI: -14 Days 00 Hours MAPP:17270, Active Ingredients: Alpha-cypermethrin 10.00%, Expires:31/01/2020 Arthropod Buffer Zone: To reduce effects on non-target insects or other arthropods: Do not spray listed cereals within 5m of the field boundary. Avoid spraying other listed crops within 5 m of the field boundary when applied through tractor-mounted boom sprayers. (Statutory) EAMU:0518/17									
Headland Sulphur				2.500	14.250	L			
Comment:800 g/l of elemental sulphur. Relative density - 1.45									
Wetcat				0.300	1.710	L			
Phorce				0.500	2.850	L			

Job 2 HSE Details to be completed by operator - tick all appropriate boxes

Please complete

Product labels read  Yes  NA Bee keepers notified  Yes  NA

Field hazards noted  Yes  NA Neighbours notified  Yes  NA

Warning notice in crop  Yes  NA

Suitable protective clothing worn

Faceshield / Goggles  Coverall  Apron  Respirator / Mask

Boots  Hood  Gloves

Hazard classification

Not classified  Toxic

Very toxic  Corrosive

Harmful  Flammable

Irritant  Risk to bees

Post treatment - containers

Washed and triple rinsed

Securely stored prior to disposal

Sprayer washed out

Signature

As you will know, growers are required to keep records of all spray applications, any records relating to parsley cultivation need to be fully available to Camstar Herbs upon request.

All spraying applications need to conform to the Permitted Pesticide List (PPL) for Herbs and the finished product must be within the EU Maximum Residue Levels (MRL's). This means that strict adherence to harvest intervals and ensuring no cross contamination from other crops and good sprayer cleanliness is essential. The production of good quality, high yielding crops free of pesticide residues can be achieved as long as guidelines are adhered to. Random samples are taken from the processing line at different intervals during the harvest season from each grower. These are sent away for pesticide residue screening to ensure all produce is within limits and safe for food use.

Darryl Shailes of H. L. Hutchinson Ltd currently works closely with Camstar Herbs and has over twenty-five years agronomy experience regarding parsley and comes highly recommended to any new or existing grower.

## Harvesting



**Ploeger Machine acquired in 2012 with Plucker Header**

Our harvesters are from Ploeger and they are self-propelled harvesters that have the capability of enabling 1 operator to harvest 30 containers in a 12 hour period. Camstar are now working alongside Evergreen Harvesting who contracts to Camstar to do all the harvesting of Parsley, together we are in the process of procuring a second machine which will enable Camstar to retrieve the crops as efficiently as possible.

Both machines are run on 4 large tyres which reduces ground pressure and we will have the choice of either a plucker or cutter header to ensure effective collection of your crop. The 2014 harvester header has a plucking mechanism which plucks the florets from the stalk to maximise throughput during processing. The 2019 Harvester will have a cutter header this will give the opportunity to retrieve lower crops when needed.



Proposed new Harvester with Cutter Header applied.

We have another added component on the harvester which is the insect blower, which removes a high percentage of insects, such as ladybirds, fly's etc. The insect remover on the front of the harvester is designed to retrieve the crop by a sucking action and then blow the insects onto the parsley stubble.



Ploeger MK 2100L plucking mechanism header with unique insect sucker blower attachment



Picture of field after the Plucker Header has been used. Please note that lower graded parsley will be left behind after harvesting.



## Topping



Immediately after the first harvest topping is essential. Topping ensures any remaining stalk and dead plant is removed and helps prevent any disease build up, thereby providing optimum conditions for second cut growth. Fertiliser is then applied at a rate of 70-100 kg/ha.



Where irrigation is available this will inevitably speed up any new growth. A fungicide application is applied to the new growth, as fungal infection can lead to discoloured leaf.

Harvesting of the second cut usually takes place around five weeks after the first cut. Harvesting will continue in rotation for the second cut. Third cuts are usually possible, weather permitting, with further applications of fertiliser and water. Topping at this stage is essential as any dead stalk will be very detrimental to the grading of dried product; this is due to the fibrous nature of the plant at this stage. The harvesting and processing season usually continues until the end of October, although sometimes this can be until mid November. The Estate Manager will continually monitor the health and growth of all parsley crops and will advise on harvesting dates.

### **From Field to Factory**

All harvesting and the hauling of parsley for Camstar Herbs is currently contracted out to Evergreen Harvesting. This helps to ensure the parsley gets from field to factory fast and efficiently.

As the British Food Consortium have introduced version 8 this year we are now introducing a Welfare Trailer that will be at the field for the harvester and all staff. The welfare trailer will have spares parts on board to cover any unforeseeable breakdowns. Evergreen also have a full time In House Mechanic, adding to this the back up of Ploeger and its network of local service representatives to meet the harvest requirements day on day.

The Welfare trailer also enhances hygiene aspects for all staff while they are present in your fields.



Double Bulkers at Camstar 1

## Trials

Camstar Herbs are currently investing in various trials to further enhance the performance of the crop. These trials are being carried out by Darryl, who has over the years conducted several trials on herbs both for Camstar Herbs and the Horticultural Development Company (HDC).

Three areas currently being investigated are Blackgrass control in parsley, the use of adjuvants to reduce the bleaching from Clomosome used pre-emergence in parsley and a Linuron replacement strategy.

In addition to the herbicide trials Camstar Herbs are conducting drilling trials using various seed rates and starter fertilisers in parsley. We are also looking at inter-row spraying as a means of reducing weeds and hand weeding in the crop. Camstar has now purchased a Hoe for the 2019 season which we envisage to again help reduce the hand-weeding burden.



Trial Plot with Markers.

We are working very closely with the Agriculture and Horticulture Development Board (AHDB) to try to get new actives for the crop and to manage the loss of existing actives. One of the biggest challenges is residue management to comply with the various end markets and we have an ongoing strategy to reduce residues where possible.

From the 2018 harvest and subsequent trials we have found that

the basic growing plan for parsley apart from weeds control has unchanged in recent years and the biggest challenge is still good establishment. Parsley seed has very low vigour and is very susceptible to compaction of the soil. The biggest issue we see year on year now that most growers do not use power harrow combination drills. Smearing at the coulters causing fanging of the roots when the soil is in a plasticine state at the bottom of the coulters. As shown below.



The picture above shows that there is a sharp contrast to good roots where no smearing at coulters depth occurs.

Good long tap roots allow the crop to utilize all the soil for moisture and nutrition not just the top 2-3 inches. Re-growth with compromised root systems is very restricted especially in a dry summer.

In 2018 we also saw a lot of capping and some fields were irrigated to help with emergence.

Drilling in front of rain on capping prone soils should be avoided.

Weed beet will be a challenging to control with the loss of linuron as the only contact material we have will be Phenmedipham also used in Sugar beet for weed control, so fields with bad weed beet should be avoided.

## **Trials 2017/2018**

In recent years we solved many issues but the loss of linuron will have an unavoidable impact on parsley production. The “Fire Brigade” treatment will be lost.

We thought we had a ready-made replacement in Metobromuron and did many trials with the material and learnt how to use it. Unfortunately, the manufactures will not support the active intro new crops currently. Without their support it's impossible to get an EMAU (Extension of Authorisation for Minor Use). The carrot and parsnip growers are in a similar position to herb growers.

Consequently, there has been a ramping up of trials activity in 2017 and 2018. Camstar took a whole 4 ha field and over laid strip trials of different pre-emergent treatments across the field. In total 12 different treatments were looked at in tractor tramlines and repeated across the field. An area was also drilled with primed seed and showed a 10-14-day advantage in terms of emergence. This will be investigated further in 2019.

## **Images from Trials**

The germination was patchy as were many fields in 2018 and consequently the data generated was not as good as it could have been, but all treatments appeared to be safe to the crop and within acceptable MRL's when samples were taken at a harvestable stage of the crop. All but one treatment showed weed control to an acceptable level similar to the standard Afalon programme.

Further trials were conducted across of range of sites and soil types and some whole fields were grown with no Linuron the whole 2018 season. These included parsley, coriander and dill, all umbellifer crops where linuron has played an important part.

A 6.5 ha field was grown with no linuron, the weed burden on this 6.5 Ha, apart from some volunteer onions was very low.

The field had Pendimethalin , Clomazone ,Dimethenamid-P, S-metolachlor , Phenmedipham and Lenacil applied across different areas and all treatment worked well.



Trial Pictures.

In 2019 we are also hoping to have a new active called Aclonifen from Bayer. It has been approved for a number of years in Europe and is used commercially on some herbs.

Aclonifen was looked at in a limited number of crop-destruct trials and again appeared a useful addition to the tool box.

In the year 2019 we will be refining and improving the strategy of weed control in parsley both in the commercial crops and in trials.

## Nutrition

### Nutrition

**Nitrogen:** in general, 50 kg N to get it established then a further 100 kg per cut. Sulphur should be added to the first application if low Soil S.

**Phosphate:** available P is a contentious issue and depends on many factors including Soil Organic Matter content and moisture availability. A small amount of P may help establishment even on relatively high index soils.

**Potassium:** Parsley is a Potassium hungry crop and generally apart from K releasing soils will require treating.

**Magnesium** can be based on indices.

Parsley will respond to Sodium so applications to soils where Salt is used for sugar beet can be beneficial.

**Boron** may be needed on some sandier soils but can be applied as a foliar treatment.

Trace element can be applied as foliar treatments as required.

All chemicals will be advised by our Agronomist, but the above gives a brief overview of the requirements.

## Weed Control

Clean fields free of perennial broad-leaved weeds such as thistles should be chosen.

Camstar now have a team of weeders that are specifically trained to efficiently remove weeds from the fields by way of hand weeding. This was introduced due to the battle against losing so many herbicides.

Weed beet will become an issue with loss of linuron along with Volunteer potatoes will both need direct physical control. This is a more traditional method of removing weeds from crops by directly pulling (hand Roqueing) them or by hoeing them. Direct weeding is crucial to perform an effective first weed to prevent early competition.

Control will be based on a pre-em residual stacking depending on soil type and expected weed burden.

Post emergent broad leaved weed contact herbicides are limited to Phenmedipham.

Blackgrass can be managed with Propyzamide and Clethodim

## Fungicides against Disease

Parsley suffers from a range of diseases including:-

### **Downy mildew**

Produces sporangia of determinate growth. On seedlings, symptoms occur on cotyledons, true leaves, hypocotyl and stems. A common symptom is the downy growth mostly on the lower leaf surface. Spores germinate on wet leaf surfaces, penetrate the host and grow for five to seven days absorbing nutrients from plant cells by haustoria. Downy mildew diseases thrive under cool (15-23°C) moist conditions with a high relative humidity (85% or higher) at the leaf surface.

### **Powdery mildew**

This fungus will first appear as powdery white patches that are fairly small in size on the surface of host plants. It mainly targets the plants leaves but will sometimes travel to shoots. These spots slowly expand to cover a significant portion of the plant's stems and leaves. The exception to this is the variety *leveillula taurica*, which will form spots that are more yellow in color and will not appear as powdery as the other varieties. When a plant has powdery mildew, leaves can turn yellow and brown, sometimes leading to death. This disease can also create twisted and buckled leaves. Due to this fungi's ability to thrive in dry environments and its preference to warm weather. Temperatures between 60 and

80 degrees Fahrenheit are the most advantageous for this disease. Shady areas are also highly beneficial for spore development. Growth will become challenging for powdery mildew if temperatures exceed 90 degrees Fahrenheit, especially when in direct sunlight.

### **Septoria**

Is a fungal disease. It can be very destructive and affects a wide range of other plants and vegetables. Normally occurs during periods of high humidity when are between 60° and 80°F. Septoria fungi spores are wind and rain borne. Hyphae enter the plant through cracks and wound in the plant tissue. Leaf damage starts as small yellow spots that gradually turn brown. An illustrations is captured below.

### **Sclerotinia.**

Commonly known as white mold and is a destructive disease caused by a fungus. It favours prolonged wet and cool weather. A key characteristic of the pathogen is its ability to produce black resting structures known as sclerotia and white fuzzy growths of mycelium on the plant it infects. The life cycle of the fungus occurs mostly in the soil and thus most host symptoms begin at the soil surface, through the fungus can be transported by air.



Septoria



Downy Mildew

A programmed approach based on weather conditions and infection risk will be advised during the season.



Actives utilised will be azoxystrobin , difenoconazole, mandipropamid , metalaxyl , mancozeb.

All leaf disease leads to a loss of green leaf area so needs controlling.

Insects

Parsley can suffer from Carrot Motley Dwarf virus transmitted by Willow Carrot Aphids. Parsley is less susceptible than carrots or coriander but a programme will be needed depending on monitoring of aphids in the spring.



## Processing

When cut parsley arrives at Camstar Herbs it is initially inspected by the quality control technician and/or plant operator. All parsley deemed suitable for processing is then ejected onto the infeed bulker. The driver is required to sign in each accepted load on the [daily intake product report sheet](#) and complete some brief details regarding the cut and arrival time of the product. Quality control will take a sample for analysis, with respect to the condition of the product and the amount of visible contaminants.

The product will move up the bulker conveyor into the first stage of cleaning in its raw state. The insect remover works over a module belt with belt knockers to eliminate any of the heavier contaminants such as insects, small stones and tree debris.



Wash System at Camstar 1



Intake Hoppers at Camstar 2

Moving down the outside trace it will then be high pressured sprayed to eliminate any soil debris, moving along again a module belt with knocker systems to expel the water along with the soil debris. The product then moves into a stalk removal via drum and air cannons to optimise the throughput in the factory. After this point it will enter the factory for processing. Camstar Herbs operates three separate processing plants, two are three pass driers and one flat bed drier. Overhead conveyor belts divert product from the infeed conveyor to each processing plant and into infeed hoppers. The plant operator will constantly monitor all aspects of the drying process and complete the [process control test sheet](#) which includes information about dryer temperatures, dryer take off temperatures and in-line magnet inspections. Recent plant investment includes dressing tables, indenters and colour sorting equipment to help eliminate foreign material in the dried sample. The whole process from raw material intake to dried material being palletised takes about half an hour for the three pass driers and one and a half hours for the flat bed drier.



Approximately 85-90% of weight is lost during the drying process, e.g. one tonne of raw material will produce one hundred kilos of dried product. Overall, five different dried products are produced from all drying plants. These products all have a different bulk index to suit our customer requirements.

The Camstar 2 site has now been running for six very successful years, and as we go into the seventh year we planning to enhance the capacity by adding more dressing equipment.



At Camstar 1 a second Buhler colour-sorter has been added, this one has a double pass configuration for increased efficiency. Along with the vibratory conveyor which was added in 2015 we are now fully equipped to produce the highest quality product on the market, putting us in a very good position against our European competitors.

## Systems

Dried finished product is subject to several physical and microbiological tests in the Laboratory. Samples are taken from the first bag of each pallet and from each different product. From each sample a small bag is filled to produce a library sample and a small quantity is kept to produce a cumulative sample of the lot number. The library samples are kept for a minimum of 3 years for shelf life tests.



Every pallet sample is also tested for moisture and bulk index.

Pallet samples are graded either A or B or C. Most parsley which has been processed is graded A or B, but we have occasion if the contaminants are high to grade as C Grade. This is invoiced at a lower rate than usual and it would be declared on the daily yield report that the farmer receives. Any very poor parsley would be rejected either in the field or at intake point and not put through the processing plant.

GRADING GUIDE LINES - Senior QC Check 50g	
HIGH RISK	B
MEDIUM RISK	Up to 15
LEAF QUALITY	Up to 15
FINAL GRADE	A GRADE
HIGH RISK	Up to 30
MEDIUM RISK	15 to 30
LEAF QUALITY	15 to 30
FINAL GRADE	B GRADE
HIGH RISK	Up to 35
MEDIUM RISK	35 or Above
LEAF QUALITY	35 or Above
FINAL GRADE	C GRADE

If the Total Score is greater than 30 this must be classified as B Grade, please refer to tables above

If the Total Score is greater than 35 this must be classified as C Grade, please refer to tables above

CH/S/ID132 Issue No. 010 Issue Date: 12/02/2019

Sample of the pallet Grading sheet to ensure consistent scoring.



Example of A grade dried parsley



Example of C grade dried parsley

All results are recorded on the **final product test sheet**. At the end of a lot number a sample is taken from the cumulative sample and sent away for microbiology counts, ash and acid insoluble ash testing. When the completed certificate of analysis is received the results are checked against the company

specification limits for each product. The certificates are retained for at least 3 years. A copy of the certificate is sent to all customers.

Hourly **packing hall checks** are carried out in each packing room. Bag weights and coding are checked and recorded as well as the heat seal and that the bag stitcher needle is intact.



Packing Room Operations – Metal Detection and Sealing of Bags.

Each packing line has a metal detector, which will alarm if metal is detected in the flowing product. Metal test pieces are used hourly to ensure each unit is operating correctly. These units are serviced and calibrated regularly by an outside contractor.

**Daily and weekly cleaning schedules** are completed by the quality control technician. All operatives routinely carry out cleaning during each shift; the schedules are a means of logging and monitoring what work has been completed.

Plant **maintenance records** are completed by our onsite engineers. Any work or checks carried out on equipment and machinery in the processing plants and packing rooms is routinely logged. Some examples of routine work include; checking belt tensions, bearings, chains, fans and safety devices.





One of our engineers completing routine maintenance checks



Camstar have extensive warehousing facilities.

All finished palletised product is stored on site in our purpose built warehouse with narrow aisle wire guidance which allow the order picker to

pick product according to customer requirements and dispatch in time for specific delivery dates. Several of our customers carry out independent annual audits during the processing season to ensure we comply with required standards.

Camstar is now accredited to Grade AA against the BRC 7 Global Standard for Food Safety. We are also on the Marks and Spencer A list for suppliers, a reference which is referred to by food manufacturers who supply M&S. This is clear evidence of how the business has progressed in recent years, the result of much appreciated efforts of all involved, from field to final despatch.

## Rejections

We hope the rejection of a load at intake will be unlikely. Photographic guidance is used coupled with some basic testing to ascertain if a load is suitable for processing. The main factors contributing to a reject are high levels of discoloured leaf, insects or foreign material.

It is a rare event that the load will get to the factory and then be rejected, with all the field observations that are carried out the issues will be 99% of the time the issues will be addressed in the field.

The Estate Manager will call to discuss any issues with the field.

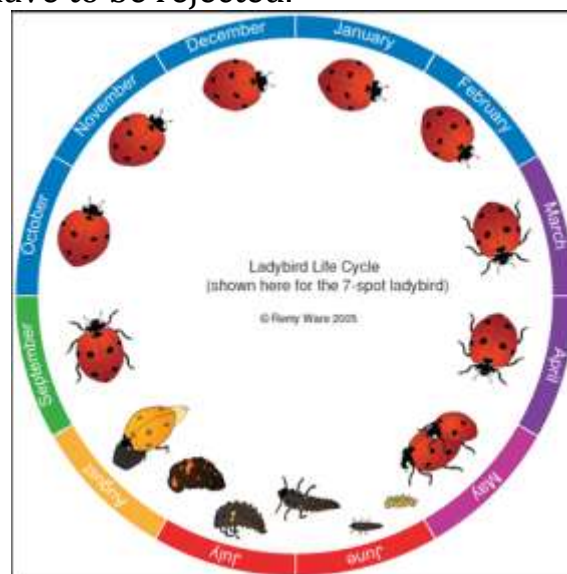


Accept quality raw material



Reject quality raw material

In the last three years ladybirds have become our biggest issue. Our U.S. customers are particularly vigilant in checking, and insects in the product can lead to it being rejected as it does not conform to Kosher standards. It is vital that at every stage of production all possible steps are taken to reduce the chance that ladybirds will reach the customer, and fields which are infested with ladybirds will have to be rejected.



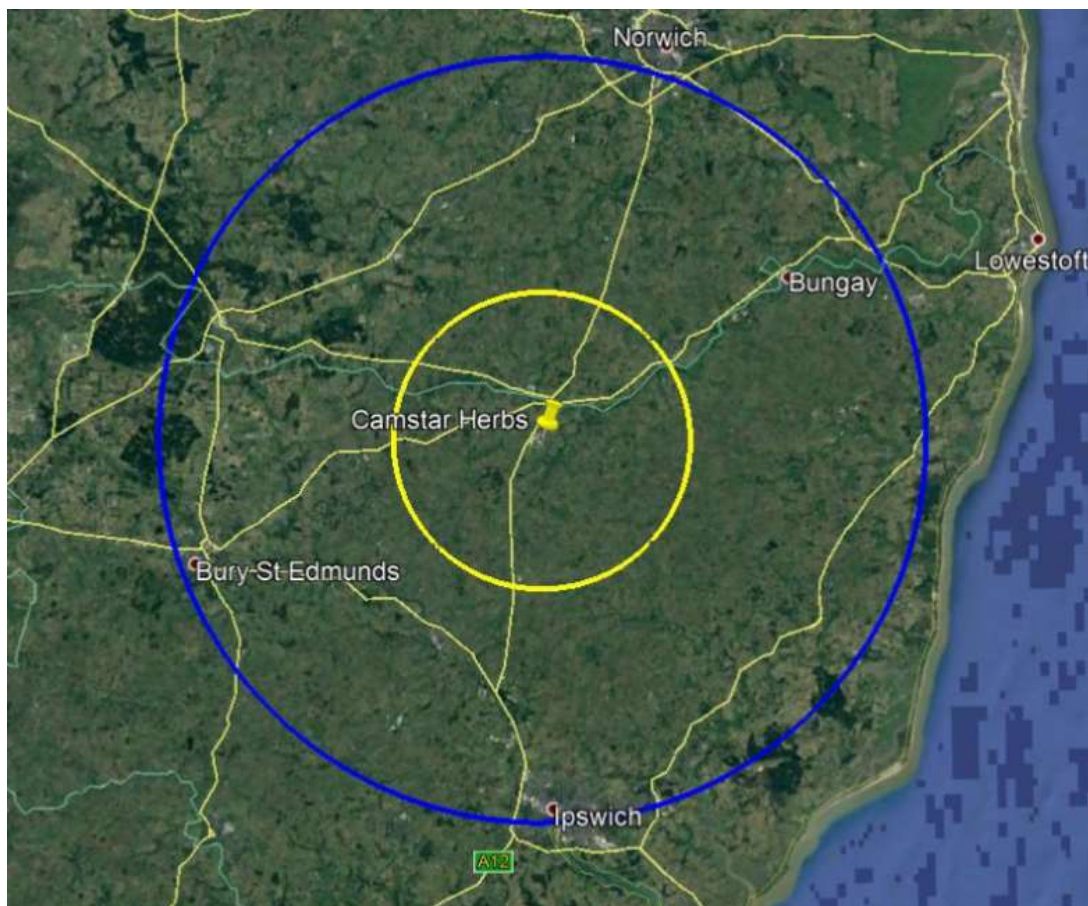
Life Cycle of Ladybirds

July to August is when you will see the increased potential of ladybirds in your crop, field visits from farmer and Estate Manager.

## Payment

The grower is currently paid £1.50 per kilo for A or B Grade with C Grade at £0.50 per kilo. At the end of each 24 hour production period a yield report is sent to the grower, by email. The report contains information regarding total kilos of dried product processed within the previous 24 hours. It will also display the charge for the perimeter cost per field.

The grower should then invoice Camstar Herbs accordingly at the end of each cut based on the information sent via the daily yield reports. The grower can expect to receive payment from Camstar sixty days after the date of invoice.



**Up to the Yellow boundary = 31p per finished Kg Weight**

**Up to the Blue Boundary = 38p per finished Kg Weight**

**Over the Blue Boundary = 40p per finished Kg Weight**

**All growers are welcome to discuss these systems and records in further detail during a site visit. Please make prior arrangements with the Estate or Operations Manager**

## Improvements at Camstar

In line with future growth Camstar have submitted planning permission to account for the suspected growth. The project is to accommodate 5 years growth and give Camstar the ability to improve the efficiency and throughput of the facility.

Below is the proposed look to the new site.



## GLOSSARY OF WEEDS FOR IDENTIFICATION

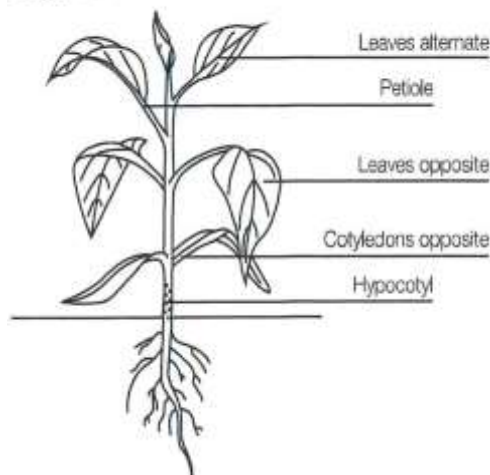
Please peruse through the following pages in respect to weeds and the likelihood of the growth in your land, this information gives you the life cycle, growth pattern and any significant characteristics.

### Broad-leaved weed seedlings

The primary leaves that emerge from the seed are called the cotyledons. The first and then the second true leaves follow. The size and shape of the cotyledons and the first true leaves are fundamental early identification features, along with other distinctive features.

The seedling stem is the hypocotyl, which varies in length and colour.

Diagram 1



### Grass weed seedlings

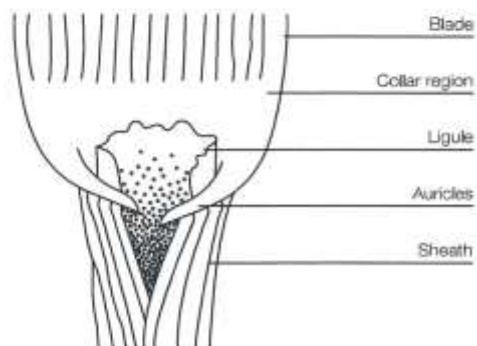
Seedlings of grass weeds in this guide can be identified from the:

- First leaf shape, length and direction of twist.

Young and mature grasses in this guide can be identified by the:

- Leaf blade: Colour, shape, twisting, hairiness, ribbing or tramlines, shape at the tip
- Auricles: Small claw-like feature at the junction of the leaf sheath and blade
- Ligules: Membranous extension at the junction of the leaf sheath and blade (Diagram 2 below)
- Leaves may be folded or rolled in the stem (Diagram 3 overleaf)
- Rhizomes: Underground stem bearing buds in axils of reduced scale-like leaves. Present or absent.

Diagram 2





**Features to aid identification at early stages of growth.**

Cotyledons oblong, large, notched at tip, dark green sometimes purple.

First true leaves lance shaped, hairy and in whorls of four.

Stem is square with hooked spines.

Later leaf shape is visible, toothed, whorl of leaves around stem.

**Significant features of the weed.**

A straggling climbing annual and perennial with characteristic sticky hairs.

A common weed throughout the UK that survives dry conditions well due to deep roots.

Prefers loams and clay soils that are well watered.

Germination depth shallow (1-5cm) but never on the surface.

Can produce up to 1000 seeds per plant. Flowers provide an important pollen or nectar source for hoverflies.

**Cleavers**

*Galium aparine*



**Features to aid identification at early stage of growth.**

Cotyledons oval, narrowing to a stalk with purple underside.

Hypocotyl purplish, medium length, carries the cotyledons just above the ground.

First true leaves step-like teeth and smooth and stalkless.

Later leaves variable but always indented or with teeth. May be with or without hairs.

**Significant features of the weed.**

An annual or biennial with upright growth, small yellow tubular flowers and a ragged appearance.

Prefers loose sandy loams or sands rich in nutrients.

Seeds are readily dispersed by the wind.

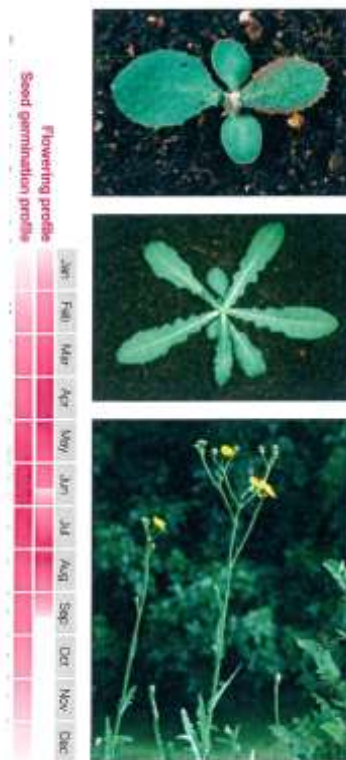
Shallow germination 1.2- 2 cm

Flowers throughout the year, producing up to 1200 seeds per plant.

Flowers provide an important pollen or nectar source for hoverflies.

**Groundsel**

*Senecio vulgaris*



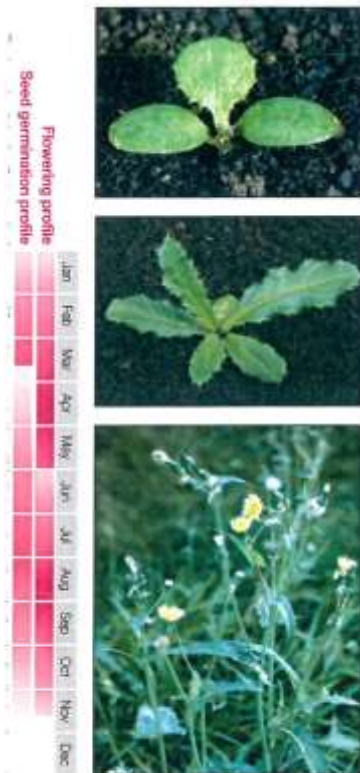
**Perennial Sow-thistle**  
*Sonchus arvensis*

**Features to aid identification at early stage of growth.**

Cotyledons oval, medium sized, smooth, reddish purple on the margins and light green in colour, purple hues beneath, close to the ground. First true leaves round oval with downwardly-directed teeth at the margins, few thick white hairs.

**Significant features of the weed.**

A tall upright perennial with large bright yellow flowers, widely distributed on a range of soil types. Likes fresh to wet, heavy deep loams and clay soils rich in nitrates and humus. Spread mainly by root fragments when the crop is hoed, only partially by seed. Repeated early cultivation early in the season will arrest root development and limit spread. Shallow germination approx. 0.5 – 3cm depth. Can produce up to 10,000 seeds per plant.



**Annual Sow-thistle**  
*Sonchus spp.*

**Features to aid identification at early stage of growth.**

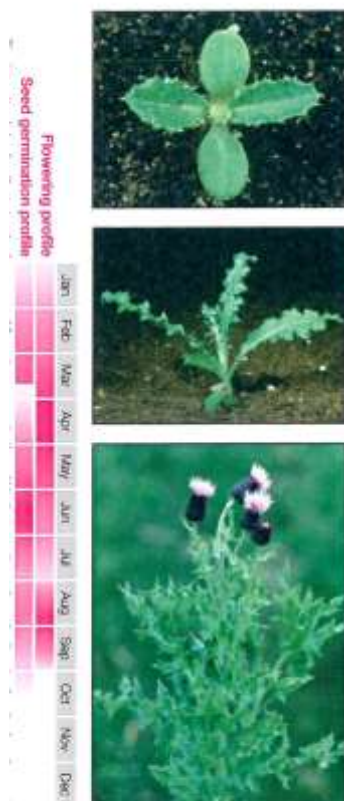
Cotyledons oval, medium sized, smooth, reddish purple on margins and light green in colour, purple hues beneath, close to the ground. First true leaves round –oval on a long stalk, with downwardly-directed teeth at the margins absent on smooth sow-thistle.

Later leaves broader than perennial sow-thistle.

**Significant features of the weed.**

Upright annuals with yellow flowers smaller than Perennial Sow-thistle. Can be difficult to hand weed due to the strong tap root. Common weeds of cultivated land and field margins. Prefers warm conditions, nitrogenous, light loams or sandy or stony soils and not too dry. Can produce 5000 – 100,000 seeds per plant. Flowers provide an important pollen or nectar source for hoverflies.





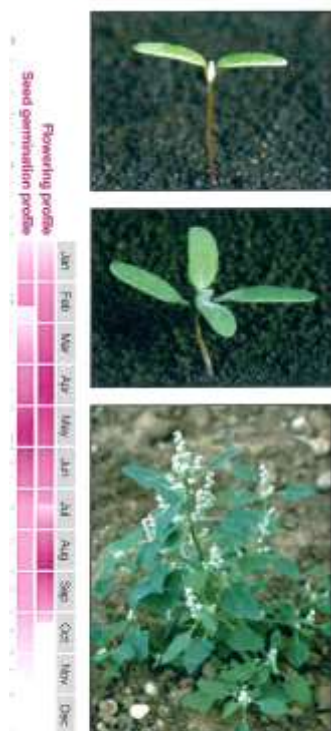
**Creeping thistle**  
*Cirsium arvense*

**Features to aid identification at early stage of growth.**

Cotyledons oval, fairly large and fleshy.  
First true leaves oval with sharp spines and triangular indentations.  
Later leaves light green.

**Significant features of the weed.**

An upright deep rooted perennial with clusters of purple flowers on top of tall stems, found on most soils.  
Troublesome weed in intensive Brassica production. A late emerging persistent, aggressive plant that can spread by seed and as a result of fragment regeneration of root pieces > 5cm during tillage of soil.  
Prefers fairly dry, lighter, aerated, deep loam soils. Shallow germination (<2cm) all through the year. Working a stale seedbed at three weekly intervals throughout a season will reduce root generation by 99%.  
Can produce 4000 – 5000 seeds per plant.  
Flowers provide an important pollen or nectar source for hoverflies and beetles.



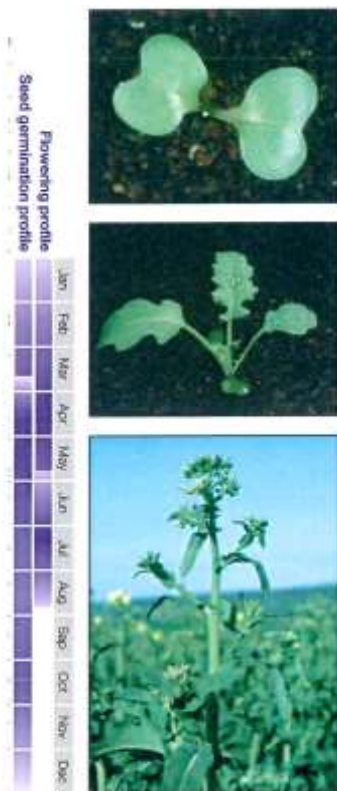
**Fat hen**  
*Chenopodium album*

**Features to aid identification at early stage of growth.**

Cotyledons fleshy, much longer than wide, mealy white, purple underside stalk absent, flat to the ground.  
Hypocotyl slender, medium length (1cm), purplish.  
First true leaves oblong, mealy with toothed margins, purplish underside.  
Later leaf is waivable.

**Significant features of the weed.**

A branching annual of erect habit (up to one metre tall) with dense clusters of small green flowers.  
A very competitive widespread weed, common on arable land that removes great quantities of nutrient from the soil.  
Can germinate close to the surface or from depth (8cm).  
Can produce anything from 3000 – 20000 seeds per plant.



### Oilseed rape

*Brassica napus ssp. oleifera*

#### Features to aid identification at early stage of growth.

Cotyledons kidney-shaped, tip deeply indented, gradually narrowing to stalk. First true leaves oval with indented margins, blue grey.

Is similar to Charlock but has a broad rounded tip to the first true leaves and shallow indentations of the leaf margins.

#### Significant features of the weed.

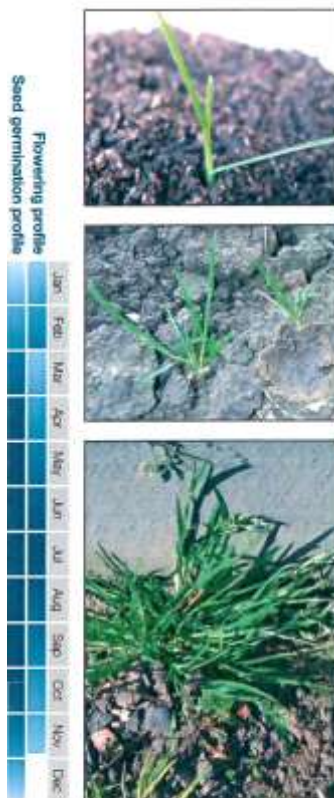
A volunteer weed that is a particular problem to control in all Brassica Crops.

Very deep rooted once established.

Flowers and seeds will contaminate produce.

Will germinate from up to 4cm below soil level.

Can produce up to 1200 seeds per plant.



### Annual meadow-grass

*Poa annua*

Weed

#### Features to aid identification at early stage of growth.

First leaf erect with broad upper part tapering abruptly to a blunt point.

Leaf folded not rolled.

Leaf blade light green with boat shaped tip, often crinkled, hairless, tramlined and slightly keeled.

Auricles absent.

Ligules medium length, 2.5mm, roundly pointed and serrated.

Spikelets branched and spreading, triangular in outline containing 3-10 flowers.

#### Significant features of the weed.

Small, loosely tufted annual or short-lived perennial that is troublesome throughout the year.

Difficult to hand weed once established.

Can produce up to 500 seeds per plant throughout the year.

Seed can survive in the soil for up to five years.

Seeds eaten by carabid beetles.



**Features to aid identification at early stage of growth.**

Pointed green shoots with folded needle-like leaves pointing upward around the stem. Shoots attached to rhizomes, which may be extensive and reach a depth of 1.5 metres. Plant has a fern-like appearance when fully mature.

**Significant features of the weed.**

Troublesome very deep rooted rhizomatous perennial of uncultivated land that encroaches into field margins.

Active from Feb- Nov in any soils with low fertility.

The main method of spread is by vegetative reproduction of detached rhizomes and tubers in March- May and again October – November.

Fertile single cone can produce 100,000 spores which are short lived.

**Field horsetail**

*Equisetum arvense*



**Features to aid identification at early stage of growth.**

Cotyledons roughly kidney-shaped but asymmetrical, broader than long, notched where leaf joins stalk, long stems with conspicuous hairs.

First true leaves round the outline but divided with 7-9 segments, soft erect hairs on both sides.

**Significant features of the weed.**

Increasingly common on arable land.

Small pink/violet flowers.

Prefers sunny, dry, sandy, loose soils.

Shallow germination (<3cm)

Can produce 10,000- 20,000 seeds per plant.

**Dove's-foot Crane's-bill**

*Geranium molle*



**Fool's parsley**  
*Aethusa cynapium*

**Features to aid identification at early stage of growth.**

Cotyledons long-oval, gradually narrowing into long stalk.  
First true leaves with a round outline but divided into three lobes with two to three deep indentations, often shiny.

**Significant features of the weed.**

An annual or biennial with an erect hollow branched stem and an unpleasant smell.  
Difficult to control with Herbicides.  
Prefers loose, neutral to alkaline loam soils.  
Can produce 500 seeds per plant.



**Ivy-leaved speedwell**  
*Veronica hederifolia*

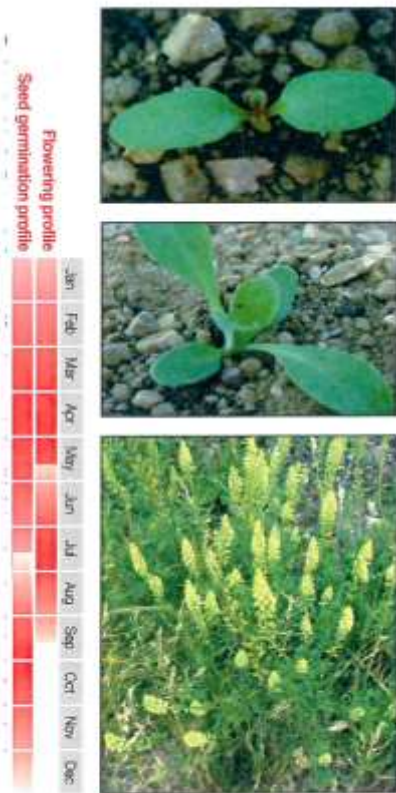
**Features to aid identification at early stage of growth.**

Cotyledons oval, very large and dull green, often purple underside on a long curved stalk, pointed at the tip with a prominent mid vein.  
Hypocotyl medium long.  
First true leaves hairy, toothed near the base, 1-3 notches on both sides, appear in pairs.

Similar to Cleavers but Cleavers has a notch at the end of the Cotyledon.

**Significant features of the weed.**

Widespread prostrate spreading annual with small blue flowers that die away in mid-summer but germinates over winter.  
Likes warm conditions and loamy soils with humus and nutrients.  
Germination in cold conditions, late autumn or early spring, needing darkness but no depth of soil.  
Can produce approx. 200 seeds per plant.



**Wild mignonette**  
*Reseda lutea*

**Features to aid identification at early stage of growth.**

Cotyledons oval-round to club-shaped with stalk 12mm long. First true leaves initially round but later ones oval-long, pointed, entire, or slightly toothed.

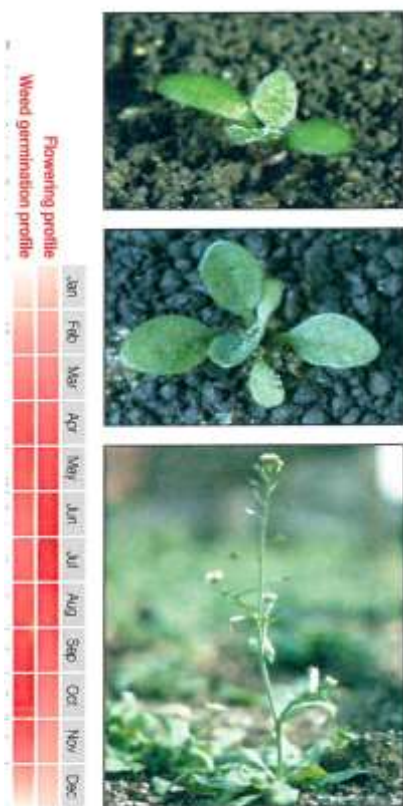
**Significant features of the weed.**

Annual found quite widely in England and Wales on well drained soils.

Common on sandy land.

Grows 30-100cm tall with a single stem or spreading branches.

Shallow germination (<3cm)



**Shepherd's-purse**  
*Capsella bursa-pastoris*

**Features to aid identification at early stage of growth.**

Cotyledons oval, narrow, small, smooth with a short stalk.

Hypocotyl short.

First true leaves elliptical with distinctive petioles, grey-green with star-like hairs.

Later leaves variable in shape, usually much divided, forming a rosette.

Can be difficult to distinguish from some other weeds due to the variable shape of the leaves.

**Significant features of the weed.**

An upright annual or biennial with a single or branching stem.

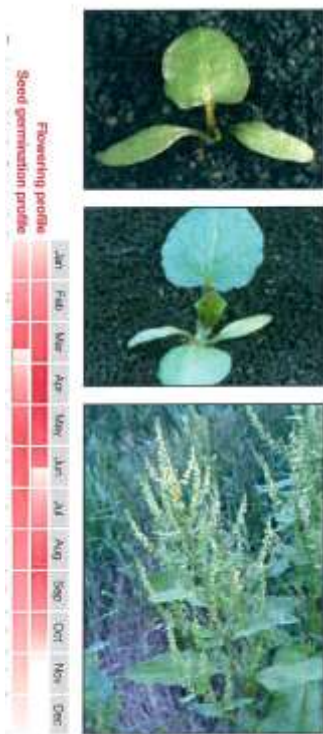
Small white flowers that produce heart – shaped seed pods borne along the entire length of the flowering stem.

A problem weed for Brassica crops.

Shallow germination (<2cm)

Can produce 2,000 – 40,000 seeds per plant, which can emerge in seven days.

Seed can remain viable in the soil for 35 years.



### Docks

*Rumex* spp.

#### Features to aid identification at early stage of growth.

Cotyledons narrow, long, medium size, often deep purple to crimson.

Hypocotyl short but cotyledons carried above the ground.

First true leaves initially rolled with frills, lance shaped.

#### Significant features of the weed.

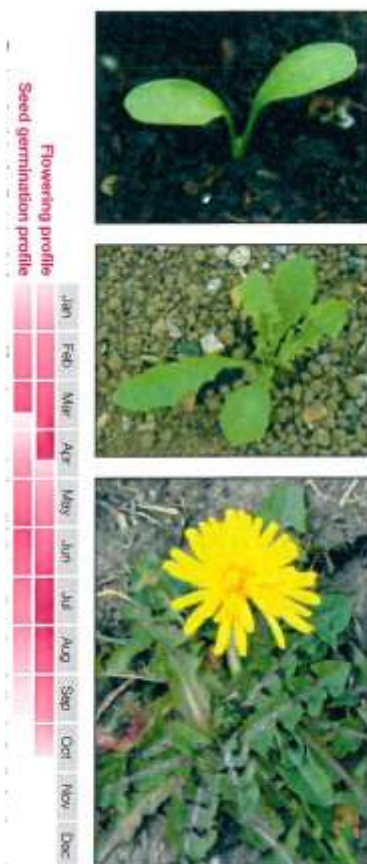
Generally, perennial weeds of meadows and pastures where they can be a real problem.

Common weeds with a deep tap root found on compacted clay loams, clay and heavier damp soils.

Spread by seed and by regenerated root fragments. Shallow germination (<3cm)

Seeds survive a long time in the soil; germination pattern varies between plants, hence extended germination period.

Can produce up to 40,000 seeds per plant per year.



### Dandelion

*Taraxacum*

#### Features to aid identification at early stage of growth.

Cotyledons oval, mostly short stalked.

First true leaves oval, dark, shiny green and hairless, margins have backwardly (downwardly) facing teeth.

Similar to perennial sow thistle, which also has backwardly-directed teeth but is bluish green.

#### Significant features of the weed.

A perennial with strong deep tap roots that covers the ground very densely, therefore competitive.

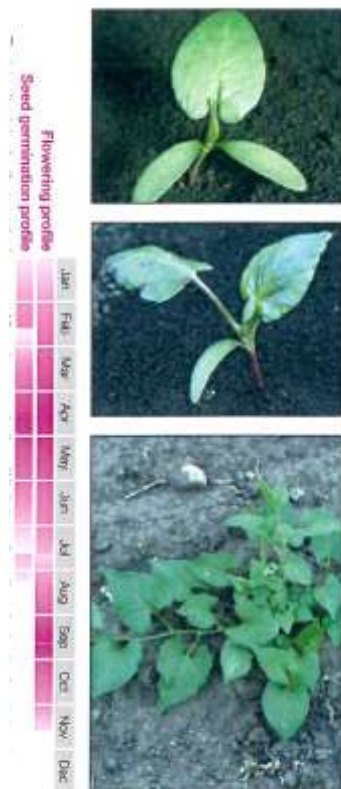
Bright yellow flowers.

Spread by seed and regeneration of small fragments of broken root.

Abundant everywhere.

Shallow Germination (<2cm)

Can produce 200 seeds per plant in the spring and occasionally again in the autumn,



**Features to aid identification at early stage of growth.**

Cotyledons oval long and reddish green, uniformly broad, underside often red.

Hypocotyl long and crimson.

First true leaves heart shaped with rounded lobes at the base, reddish-green and shiny.

Later leaves tightly rolled.

**Significant features of the weed.**

Deep rooted climbing annual unaffected by drought.

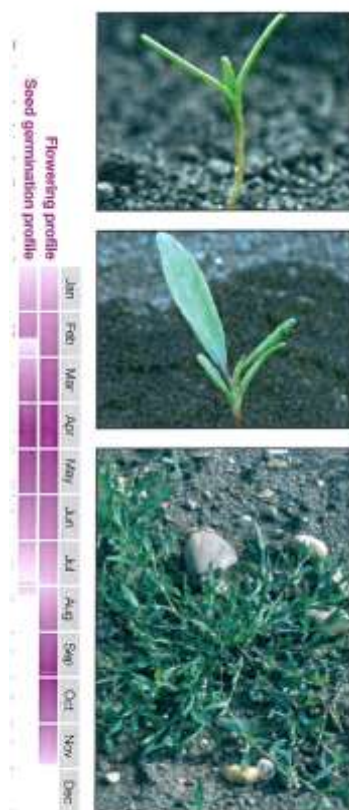
Small inconspicuous whitish green flower. Widespread in spring crops, especially on acid soils.

Germination from 0.5-4cm depth late in the season.

Can produce 12,000 seeds per plant.

**Black bindweed**

*Fallopia convolvulus*



**Features to aid identification at early stage of growth.**

Cotyledons narrow and long, thick fleshy, set at a 40 degree angle in elevation and not directly opposing each other.

Hypocotyl long and reddish.

First true leaf is lance shaped, broad at the base, long.

**Significant features of the weed.**

An annual that develops long stems with a prostrate, wiry growth habit.

Troublesome and widespread weed of mainly spring sown crops.

Thrives on nitrogenous humus loams as well as sandy soils.

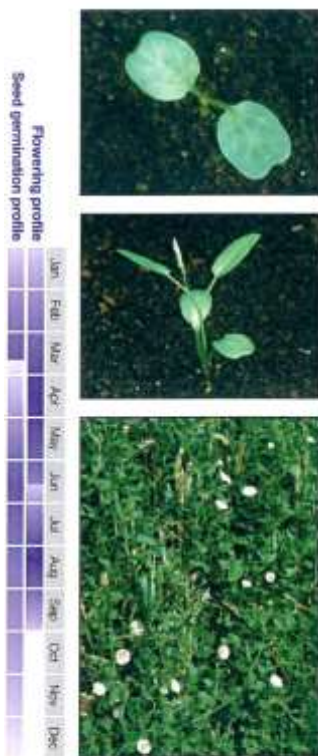
Dislikes even occasionally waterlogged or poorly aerated soils

Shallow germination, dormancy broken by low temperatures.

Pink or white flowers produce 125 – 200 seeds per plant.

**Knot-grass**

*Polygonum*



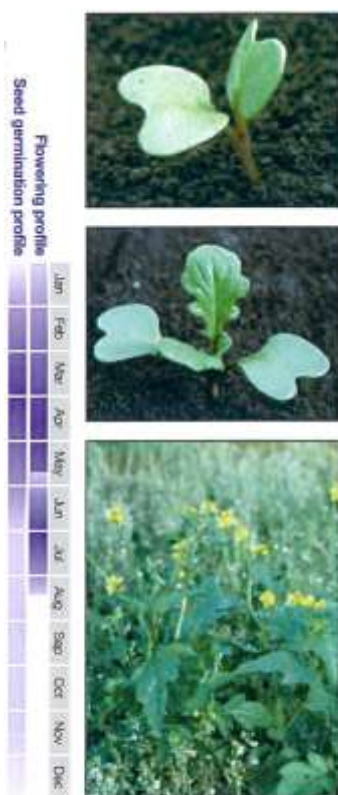
**Field bindweed**  
*Convolvulus arvensis*

**Features to aid identification at early stage of growth.**

Cotyledons heart-shaped, large with pronounced indent at the tip.  
First true leaves arrow-shaped with pointed lobes at the base, dark green and shiny, may be rolled at the edges.

**Significant features of the weed.**

A climbing perennial with funnel-shaped pink or pink and white flowers, singly or in clusters, along the stem.  
A persistent and troublesome weed that twines around other plants.  
Not a widespread weed but can be propagated by root fragments being spread across the field during cultivation.  
Prefers ward dry, deep, loose loam soils.  
Can germinate through the year.  
Forms dense mat, choking plants as it spreads.  
Can produce up to 550 seeds per plant.



**Charlock**  
*Sinapis arvensis*

**Features to aid identification at early stage of growth.**

Cotyledons kidney-shaped, large, medium length.  
Nearly vertical cotyledons stalks carry the blades of the cotyledons well away from the ground.  
Hypocotyl short.  
First true leaves with irregular indentations.  
Broad, rounded at the tip, with scattered stiff bristly hairs.

**Significant features of the weed.**

A vigorous competitive upright annual with yellow flowers.  
Especially common in Brassica crops.  
Extensive root system that develops quickly so early control is important.  
Seedlings readily killed by frost.  
Germination mostly from 4-5cm depth.  
Seeds capable of long term survival in the soil (60+ years).  
Can produce approx. 1200 seeds per plant.





**Scentless mayweed**  
*Tripleurospermum inodorum*

**Features to aid identification at early stage of growth.**

Cotyledons oval, very small, stalk less, close to the ground.

First true leaves very narrow with several lobes.

Later leaves are narrow, very finely divided, and shiny.

**Significant features of the weed.**

A bushy annual with daisy like flowers, almost scentless when crushed.

The most common of the mayweeds, likes warm conditions.

Found throughout the UK on all soil types and troublesome spring crops.

Shallow germination.

Can produce 10,000 – 34000 seeds per plant.



**Field pansy**  
*Viola arvensis*

**Features to aid identification at early stage of growth.**

Cotyledons oval, broad, dark green, indented at the tip.

First true leaves broadly rounded at the tip and toothed margin.

Later leaves broad with lobes, slightly hairy, prominent hairy leaf stalks.

Later leaves initially rolled and open one at a time, not in pairs.

**Significant features of the weed.**

An annual of upright tufted appearance with small yellow or purple flowers.

An increasingly common weed found on most soil types throughout the UK.

Very shallow germination mainly in the spring and Autumn,

Can produce 2500 seeds per plant.



**Common mouse-ear chickweed**

*Cerastium fontanum*

**Features to aid identification at early stage of growth.**

Cotyledons round-oval, rounded at the tip.

First true leaves oval, pointed, dark green and hairy.

**Significant features of the weed.**

A vigorous spreading low perennial with small white flowers that can choke young plants and affect quality.

Grows on a range of soils types.

Shallow germination (<3cm) long seed survival in soil (40 years).

Can produce 1200 seeds per plant.



**Redshank**

*Persicaria maculosa*

**Features to aid identification at early stage of growth.**

Cotyledons oval, dark green tinged with red, parallel with the ground.

Hypocotyl long and bright scarlet.

First true leaves lance shaped, broadcast in the middle of the leaf, smooth, sparsely hairy on veins and margin only.

**Significant features of the weed.**

Common annual weed of arable land, particularly damp but well aerated loams and sandy soils rich in nutrients and nitrogen.

Older leaves may have a black blotch in the centre of the table.

Upright growth habit with small spikes of pink seed-like flowers.

Can be particular troublesome in Brassica crops.

Germination mainly from 1-4cm depth but can emerge from 7cm; long seed survival in soil.

Can produce 200 – 800 seeds per plant.

## **Camstar Contacts**

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Kerry Reynolds – Operations Manager  
Harry Wilkins – Harvesting Co-ordinator  
Linda Schug – Group Technical Manager  
Neil Harkett – Warehouse Manager  
Pawel Lewinski – Engineering Manager / Plant Operator  
Rafal Kolibski – Engineer / Plant Operator  
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Jack Pickerden – Quality and Technical Assistant  
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