



Chapter 2

Growing the Crops Checklist

2.1 Working out the Cost of Growing the Crop

2.2 Contracts

2.2.1 Contractual Considerations when Growing Unregistered Seed

2.3 Seed

2.3.1 How to Get Hold of Seed

2.3.2 Seed Banks

2.3.3 Population Crops vs Single Varieties

2.3.4 Landraces

2.4 What to Grow

2.4.1 Maslin*

2.4.2 Einkorn*

2.4.3 Spelt

2.4.4 Peas

2.4.5 Non-Food Crops

2.5 Seeding Rates and Timings

2.5.1 Wheat

2.5.2 Oats

2.5.3 Rye

2.5.4 Winter Peas

2.5.5 Beans

2.6 Preparing and Cultivating the Land

2.7 Risks

2.8 Yield

Link to Chapter 02 Grown in Totnes Case Study



If you don't come from a farming background it can be a steep learning curve to understand the different types of grain and their growing seasons, and to work effectively with local farmers to grow the crops you'd like. At this point we would encourage you to consider grains that are suitable for your local growing conditions and a sustainable farming context, and that promote genetic diversity.

2.1 Working out the Cost of Growing the Crop

The prices farmers are paid for commodity crops like wheat depend on world trade and bear no resemblance to the cost of producing food - they are set by forces that link to the availability of a crop. In years of low yield, the price shoots up as demand exceeds supply, and in years of bounty they plummet. Farmers are at the whim of global patterns of supply and demand. To some extent you can set your own prices to link more closely to the actual costs incurred. However it is useful to know the global price as a guide; customers are unlikely to pay hugely above the 'normal' price for a bag of flour.

The following will guide you as to current crop prices:

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- [OF&G's newsletter includes periodic price guides](#)

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- [Organic Arable](#)

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- [Soil Association](#)

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- [Farmers Weekly](#)

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- [AHDP](#)

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Fill in the table here to work out the farmer's costs: [Work Out Your Growing Costs](#)

Below are some guide prices taken from 2014:

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- Land rental - approximately £35 per acre

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- Ground prep and sowing c £150/acre (more for a small plot, i.e. less than 5 acres £200 per acre)

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- For a breakdown of individual cultivation practices (eg. cost of combining, ploughing, etc.) search for 'agricultural contractor costs'. But first you need to know what sort of operations you want e.g minimal tillage as opposed to ploughing

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- Possible payment to the farmer for getting the harvest off the field, depending on the arrangement

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- Crop drying costs

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- Crop cleaning costs - £70 - £80 per tonne for smaller quantities, £50-60 per tonne for larger quantities

[Back to the menu](#)

2.2 Contracts

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The purpose of a contract is for all parties to agree who is responsible for carrying out and paying for each stage of the process covered by the contract, and who is responsible when a part of the contract is not met to the defined standard.

Consider if Heads of Terms* (not legally binding) or a contract is more appropriate

Things to consider including in a farmer to processor contract:

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- Who pays for the seed? (Usually it is the farmer if it is a commercial variety)

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- The farmer's growing obligations:
 - Limitations on chemical use, fertilisers etc
 - Place in the rotation
 - Quality of land
 - Weed control
 - Roguing*
 - Use and payment of any contractors

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- The farmer's post harvest care obligations:
 - Standards e.g dried down to 14%, stored in vermin-proof containers, cleaned, organic certified etc

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- Delivery of harvested grain - who pays and how?

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- State of grain at delivery

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- What the crop is to be delivered in

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- How to pay the farmer and when¹
 - If pay per tonne - farmer wins if yield is high and loses if a crop fails - the farmer takes the risk
 - If pay per acre - no incentive for the farmer to take care of the crop
 - Pay a sliding scale - if the yield is low the farmer gets a higher price per acre, and lower if the yield is high. This encourages the farmer to put the crop into good quality land in order to get the best yield but the risk is shared if the yield is low. Think about a compensation fee if the crop fails completely e.g £50 per acre)
 - Split payments
 - Up-front payment e.g the additional cost to the farmer of growing

¹ Thanks to John Letts for his advice

	<p>to human consumption standards over growing just for animal feed</p> <ul style="list-style-type: none"> ■ On what conditions are the rest of the farmer's costs paid? E.g: <ul style="list-style-type: none"> ● After grain tests for quality - moisture, level of contaminants, gluten content etc ○ How to pay the farmer a profit <ul style="list-style-type: none"> ■ Does the farmer receive a share of the profits?
<input type="checkbox"/>	<ul style="list-style-type: none"> ● Costs associated with post harvest care of the crops <ul style="list-style-type: none"> ○ Cleaning ○ Drying ○ Storage ○ Vermin control ○ Delivery
<input type="checkbox"/>	<ul style="list-style-type: none"> ● Communication methods including visits and notice
<input type="checkbox"/>	<ul style="list-style-type: none"> ● To include what happens if quality standards are not met, what steps need to be taken and by whom, for example for the farmer to use/buy back the crop for animal feed in the event of poor quality
<input type="checkbox"/>	<p>Be clear about what you are paying for and the terminology used:²</p> <ul style="list-style-type: none"> ● Ex-farm price* is the price paid to the farmer on crops sold to a contractual specification (which would conventionally include dried and cleaned to an agreed standard) ● Delivered price is the price paid by the mill, which is made up of ex-farm price + haulage + merchant margin ● Merchant margin* covers price and specification negotiation, administration of dispatching and invoicing the load (including the haulier invoice) and cost of credit insurance to protect the seller from loss if the buyer goes bankrupt. As a rough rule of thumb this is about £20 per tonne for organic grain.
<input type="checkbox"/>	<p>Other types of contract to consider, and potential sources (it is very hard to get your hands on a grower's contract as they are aimed at big agribusiness and companies want to charge for them):</p> <ul style="list-style-type: none"> ● The only free example of a contract we could find came from South Africa, it

² Thanks to Andrew Trump for his guidance - Organic Arable

includes the key aspects to consider: [S A Farmer contract](#).

- The AIC. The Agricultural Industries Confederation have various classes of paying membership which gives access to advice and various examples of contracts: www.agindustries.org.uk
- This contract is about growing grain for seed and is very detailed but has some relevant aspects and useful terminology: [Seeds No. 5/14 \(Effective from 1 August 2014\)](#)

2.2.1 Contractual Considerations when Growing Unregistered Seed

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- To cover issues around royalties if the seed is not a modern variety, is unregistered (not in the National List of Plant Varieties and Seeds), and is a population

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- To cover DEFRA seed legislation issues around ownership if the seed is an unregistered or population variety of seed, i.e. not on the National List and therefore with an ownership that cannot be transferred.³
 - If you are working with a breeder/grower who has developed a population that is not in receipt of a derogation* from DEFRA, then legally that grain can not be planted by you, sold or given away to you. Renting the grain may be a way around this, although it has not been legally tested. You may wish to draw up a contract to protect yourselves and the breeder:
 - you 1) can't pass any seed to others in any way, at any time
 - and 2) you can't regrow it other than on behalf of the breeder
 - In this event it is appropriate to work out an annual royalty payment per tonne

See Seed User Agreement in the GinT case study - 2.2.1 and in Resources - Chapter 10

* Denotes items featured in the [Glossary - Chapter 11](#)

[Back to the menu](#)

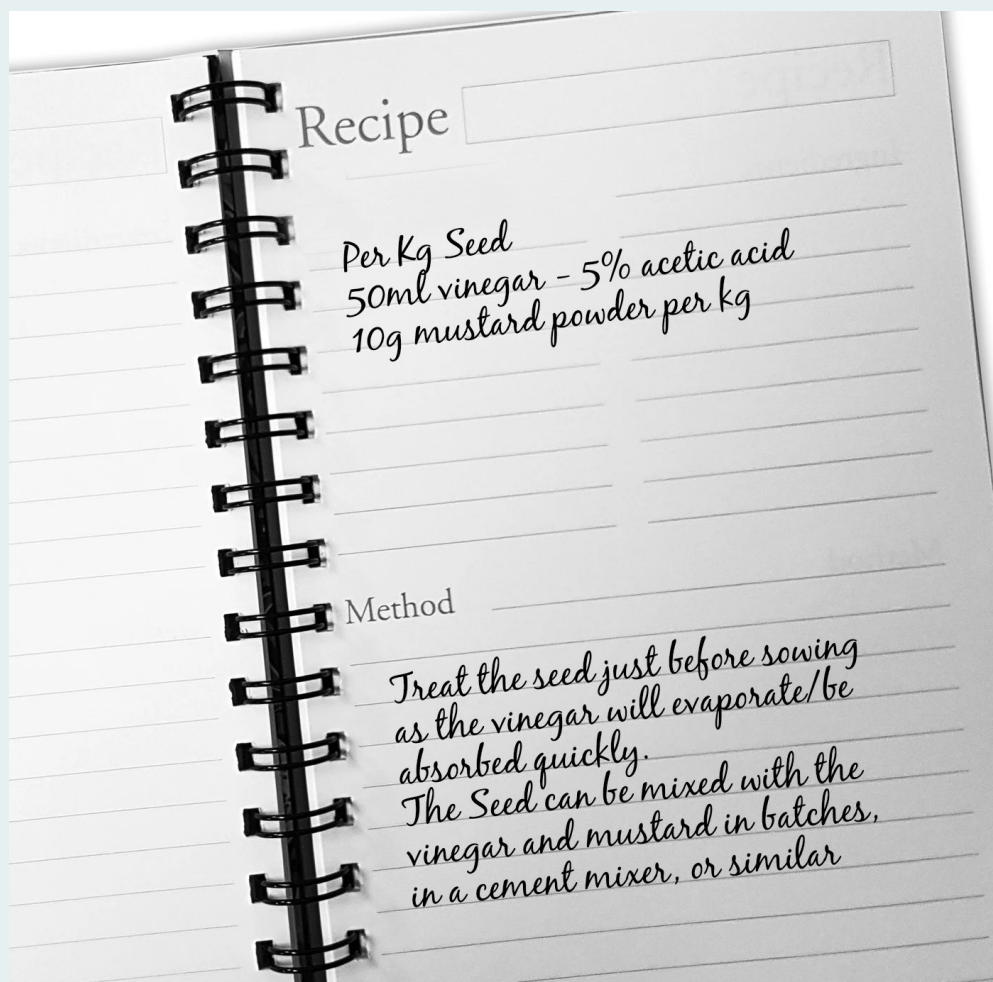
³ Thanks to John Letts for his advice

2.3 Seed

2.3.1 How to get Hold of Seed

- | | |
|--------------------------|--|
| <input type="checkbox"/> | <ul style="list-style-type: none">• Conventional seed companies |
| <input type="checkbox"/> | <ul style="list-style-type: none">• Organic Arable |
| <input type="checkbox"/> | <ul style="list-style-type: none">• Individual farmers/growers (Check UK Grain Lab's grain catalogue)
https://www.ukgrainlab.com/grain-catalogue |
| <input type="checkbox"/> | <ul style="list-style-type: none">• Seed banks if wishing to get rare varieties and bulk up (see below) |
| <input type="checkbox"/> | <ul style="list-style-type: none">• Wholefood shops (check that the grain hasn't been steamed, pasteurised or otherwise treated by undertaking a germination test*) |
| <input type="checkbox"/> | <ul style="list-style-type: none">• Seed saving: ⁴<ul style="list-style-type: none">○ Mark off a one acre or so plot, and focus extra crop cleaning on this area to use it for next year's seed. If there is wild oat in the mix, get a roguing party together for a day in the summer and cut off the oat tops - they'll flower before the crop and so will be easy to spot○ Clean the seed of weeds, and other admixes○ Polishing the Seed and then treating it with vinegar and mustard, prior to planting is a preventative measure that will ensure the seed is free from bunt or other fungal seed borne diseases . |

⁴ Thanks to John Letts for his advice



- If a farmer saves his own seed (Farm Saved Seed) from a commercial crop, they are supposed to pay a royalty of c. £50/tonne for the seed to the British Society of Plant Breeders to 'compensate' the breeder. The 'breeder' is usually a large multinational plant breeding company (eg. Bayer/Monsanto)
- Here is a useful link to the [rules on farm-saved seed](#) and how to declare

2.3.2 Seed Banks⁵



A seed bank stores collections of seeds at a constant low temperature and low

⁵ Thanks to Andy Forbes for his advice - Brockwell Bake

moisture. Their role is to preserve genetic diversity for rare or imperiled plant species in an effort to conserve biodiversity ex situ. Seed banks also enable plant breeders to choose characteristics from seeds to increase the yield, disease resistance, drought tolerance, nutrition or taste of crops. Many plants that were used centuries ago by humans are used less frequently now; seed banks offer a way to preserve that historical and cultural value.

Brockwell Bake (1) have produced [a useful website](#) which enables you to search for wheat from many of the gene banks in one place. From there you can follow the links to each gene bank to request seeds.

In principle, if a country has signed the [International Treaty on Plant Genetic Resources for Food and Agriculture](#) they should make the contents of their gene banks freely available. The reality is less straightforward and becoming more so:

- Not all countries signed - in particular Russia - which means it is hard to get hold of seeds without visiting the gene bank in St Petersburg
- In some countries their gene banks are non-functional, particularly in mid and eastern Europe
- Germany has started charging for delivery - quite expensive
- The Netherlands has had cut backs and some of their lines are no longer available, or lack fertility
- In theory, the CIMMYT collection in Mexico is the biggest, but you are liable to get hit with a hefty customs inspection charge, partly because they send them by DHL rather than the regular post

Gene banks to be found that are genuinely free include those in the following countries:

- USA
- UK
- Australia
- Netherlands
- France
- Norway
- Spain

This one is based in Norway: <http://www.spesialkorn.net/>

All of them are open to anyone to request seed, though you may need to countersign as your own 'head of department'. In all cases you won't get more than 10g of a single line, sometimes 5g or even less. If you want to speed things up in terms of growing out a particular line it is worth checking if more than one gene bank has the same line. In all cases you'll get asked to sign a Standard Material Transfer Agreement

2.3.3 Population Crops vs Single Varieties⁶



A 'population' is achieved when a diverse mixture of varieties is grown and the seed saved; those seeds, grown on, are a dynamic mixture each season. The diversity in a population is defined primarily by how many varieties are mixed in to the original population, and then how many are lost over the generations. If the population isn't diverse it won't evolve very much. Wheat is essentially self-pollinating, unlike rye, which cross-pollinates every generation. The evolutionary potential of a population is considered a powerful mechanism of adaptation to climate change when compared to single varieties (and also intensively selected heritage varieties or populations with just a few varieties in them) because of their greater genetic diversity, which results in greater resilience and the ability to adapt to unpredictable climatic patterns and outbreaks of pests. [See Contractual Considerations when Growing Unregistered Seed above](#)

Pure Line varieties are composed of highly homozygous* plants that are almost genetically identical. They can be reproduced unchanged and this allows control and ownership of seed. For a modern crop to be registered on the International Plant Register it must comply to DUS tests to ensure it is Distinct, sufficiently Uniform and Stable, i.e. the opposite to a population*. More information on DUS protocol can be found at [DUS protocols for testing plant varieties - GOV.UK](#)

2.3.4 Landraces⁷



These are associated with a particular place or area where a crop has been grown for centuries. They are very old crops, approximately pre-20th century and result from a combination of 'natural' and human selection of genetic lines that contribute more seed to the next generation, becoming better suited to local growing conditions over time. Traditional landraces are very tall, much taller than modern varieties, making them more competitive, particularly against weeds, and they perform well with low

⁶ Thanks to John Letts for his advice

⁷ Thanks to John Letts for his advice

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* Denotes items featured in the [Glossary - Chapter 11](#)

[Back to the menu](#)

2.4 What to Grow:

(See [6.2.2 - The Different Processes Required for Your Products](#))

2.4.1 Maslin*



Maslin is a Medieval word for a crop of wheat and rye, grown together in the same field and combining several varieties of each. Its flour was considered inferior to wheat flour, but was grown for the workers, on marginal land. From the mid-1300s demand for it dropped, as wheat became accessible to more people, and it has been little grown since

The mixed straws from Maslin are considered excellent animal feed. More information on Maslin can be found here: www.cooksinfo.com/maslin

2.4.2 Einkorn*



The first domestication of wild einkorn was recorded approximately 7500 BC. It is believed to originate from the fertile areas of the Tigris-Euphrates regions and was the first grain to be cultivated

It will grow on soils where most other forms of wheat do not flourish, is tolerant of salinity, and grows 4-5 feet tall. To prevent lodging (falling over), lower planting rates are used of about 100lbs per acre for spring-planted varieties and 80lbs per acre for winter ones. Nitrogen levels should be 25-50% lower than for modern wheat

The seed should be planted still in its hull. This can cause difficulties with standard

machinery so it is sometimes broadcast rather than drilled

Its hulled grains need to be dehulled after harvest to be edible, which requires special machinery including a dehuller. Because the seed is smaller than modern wheat, less flour is produced from an acre's yield

It can be used for bread, biscuits and pizza bases, and is said to have an 'earthy' flavour. It is higher in protein, vitamins and minerals than most other grains, and can be tolerated by some gluten-sensitive people

2.4.3 Spelt



True spelt has not been hybridised with modern bread wheat, unlike most modern spelt varieties. Spelt is the ancestor of bread wheat and is closely related. It was very commonly grown in the UK in the Iron Age and the Roman periods but disappeared from cultivation in the 6th century after the Saxons arrived - they presumably didn't want to spend all their time dehulling it. It was then rediscovered by health food enthusiasts in the 1970s and 1980s. The gluten of true spelt is not as strong as modern bread wheat, but it is ideal for making sourdough. Modern spelt has been hybridised with modern wheat, contains much the same gluten as modern bread wheat, and is no more digestible. Spelt can 'stand' in the rain for longer than common bread wheats because the grain is protected by the hull

2.4.4 Peas



Like so many grains, peas and beans can be grown both as a fodder crop and for human consumption. Dried peas are a good source of protein and the value of the crop can be greatly increased by selling them as pea flour.

2.4.5 Non Food Crops



When choosing your crops you may wish to consider other products that you or other local enterprises could benefit from, for example the local brewery may wish to make beer or gin using your crops, or if you are growing long straw cereals there may be a market for thatching straw, or straw bales for building. (See [GinT Case Study: 4.4 -](#)

[Straw for Housing\)](#)

* Denotes items featured in the [Glossary - Chapter 11](#)

[Back to the menu](#)

2.5 Seeding Rates and Timings

The information below is for guidance only. Exactly when to sow and at what seeding rate is subject to many variables - weather, temperature, soil type and condition, variety of seed, etc. These decisions will need to be made in conjunction with the farmer or from further research of your specific site

For oats, rye, and wheat the seeding rate is usually 90 to 120 lb per acre

2.5.1 Wheat:



- 200-300 seeds per square metre, depending on the variety and date sow
- Winter wheat is often sown in late-September and October and needs to go through a process of vernalisation* in order to flower
- Spring wheat is planted from early February to mid-March, and certainly by April
- The harder winter wheat usually contains a higher protein content than spring wheat and is suitable for making pasta and bread
- Spring wheat is used for products that do not require high-protein content, such as pastries and cakes
- Heritage Population Wheat: Plant at 75 kg/acre. It can be sown any time from mid-September until Christmas

The advantage to the farmer of spring-sown wheat is that the weather window for planting is usually much greater than in autumn

2.5.2 Oats



- Plant during Spring or Autumn and harvest about 6 months later
- Optimum seed rates range from 300-350 seeds/m² for husked oat varieties
- www.wikihow.com/grow-oats

2.5.3 Rye

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- Early sown: (15-30 Sept) 200 seeds/m²
- Mid-sown: (1-30 October) 220-240 seeds/m²
- Late sown: (after 1 November) 260 seeds/m²
- Sowing depth: 2cm (seed must be covered)
- Harvest: End of June/early July

2.5.4 Winter Peas

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- Seed rate of 157kg/ha
- Sown in autumn

2.5.5 Beans

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Beans should be planted after the last frost has passed, typically in the spring months of March and April. They mature in 45 to 75 days, depending on the variety and the climate

* Denotes items featured in the [Glossary - Chapter 11](#)

2.6 Preparing and Cultivating the Land

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Preparing the seedbed is vitally important for a good yield. A good place to start is by testing the soil for its pH and nutrient content. The result of the test will determine whether it is suitable for the crop you want to grow and whether anything needs to be added, e.g. lime*. Soil testing* companies can be found [here](#).

The area is then ploughed* or tilled*, unless you use the no-till* method, and a finer tilth is achieved by harrowing*. If you have time to leave the area fallow for a few weeks, this allows any weeds to come through which can then be removed. This is known as a false seed bed* and is a useful tool especially if you don't want to use herbicides. Meanwhile you can do a germination test* on your seeds. The seeds are then sown by means of a seed drill*. Once the crop has started to grow up, any surviving weeds and failing crop plants should be rogued* out

* Denotes items featured in the [Glossary - Chapter 11](#)

[Back to the menu](#)

2.7 Risks

(See [GinT Case Study - Chapter 2 - Growing the Crops](#))

[Back to the menu](#)

2.8 Yield



Yield is the amount of grain harvested, usually per hectare with the moisture weight averaged at 14.5%

There are many variables that can affect yield:

- Choosing a variety of seed that grows well under your growing conditions is essential
- Soil type
- Weed control
- Planting and harvesting times
- Weather
- On average, organic yields are 20 – 25% less, though they vary widely in organic farming



- In the UK it is drier on the east side of the country which favours grain growing, especially wheat, whereas rye and oats are often grown in the more northern and western regions as they tolerate more rainfall. However, local area and field conditions, and good farming practice are more significant influences on field yield than large-scale regional indicators

