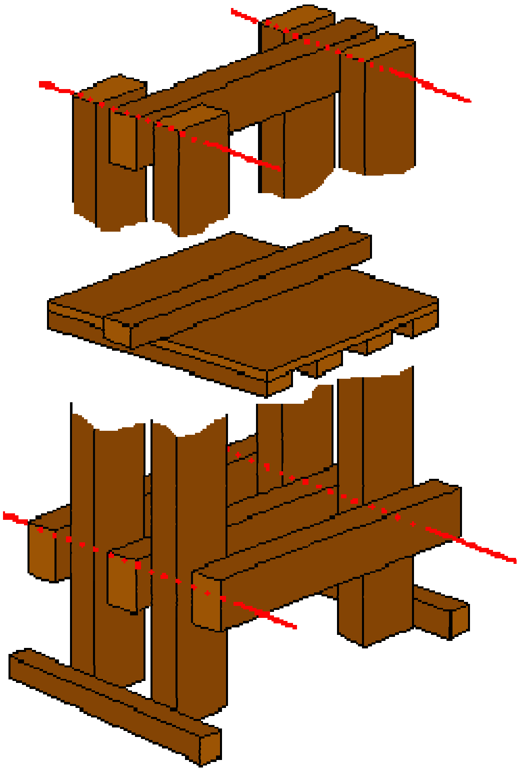
HOMEMADE FRUIT PRESS

CARCASS



You will need;

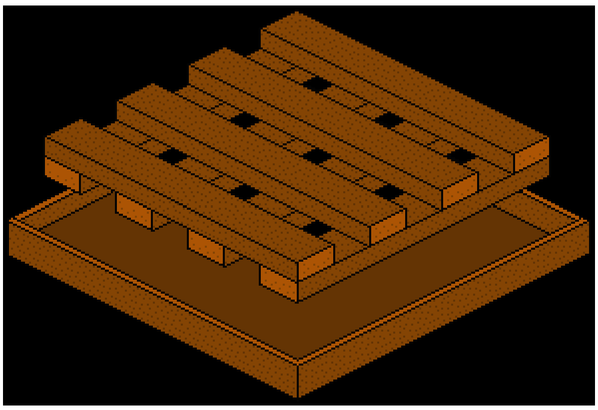
8 Lengths of 120mmx50mm timber
4 at 1½m for the uprights
4 at 750mm for the cross members.

3 750mm lengths of 45x45mm for the legs and the top member of the pressing plates.

Bolt the larger timbers together as shown by the red lines with strong coach bolts. You will need 2 each of 8 and 12 inch bolts. Allow a space of 400mm beneath the lower cross pieces for the collecting vessel. Screw the legs on the bottom to provide support.

PRESSING PLATES

The third length of 45x45 is screwed to a 25mm board measuring 450x450mm with 19x25mm batons attached to the underside as can be seen above. This forms the upper of the pressing plates. It can be located between the two sets of legs by inserting at an angle.
The bottom plate is a tray formed by screwing 25x75mm timbers around another 25mm board measuring 500x500mm. This will rest on the lower beams of the carcass. A hole is drilled through the bottom to let juice run through into the collecting vessel. Line the hole up to one side of the carcass beams. Between these two plates are 3 plates constructed from a latice of 19x25mm timbers as can be seen to the left.

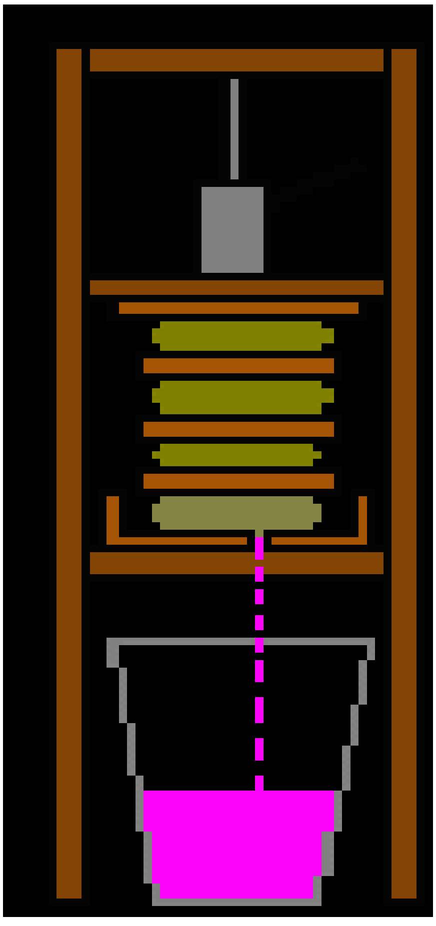


USING THE PRESS

There is one more component needed to use the press. This is a telescopic car jack. This is placed between the top cross member of the carcass and the cross piece of the upper plate to provide the pressure. This cross piece runs between the two sets of uprights as a guide.
These instructions recommend making 3 middle plates but the number will depend on the size of the jack used. There is no problem with leaving one out if you don't have the space. Additionally, as the pulped is crushed, wooden blocks can be added if the jack isn’t long enough.
The fruit to be pressed should be chopped up by hand first and then split into equal parts to go between the plates. Each part should be wrapped in strong hessian cloth. Pillow cases also work just as well. If using rotten, or soft fruit (grapes, for example), no initial crushing is needed, as the press will do this in a single step.
Apply pressure evenly and catch the juice in a bucket or fermentation jar as it flows out the hole you have drilled below.
The press can easily be disassembled for storage or cleaning.

Costwise… Suitable timber is about £1.50/m from a builders’ yard, Focus DIY will supply you with all steel thread and nuts for about a fiver, and a sheet of 2 foot by 4 foot ply is again a fiver from Focus.

It can also be used for cheese, by replacing the higher plate with a round disc that will slide down inside a washing machine drum.



How to make cider!

Taken from:
http://ourworld.compuserve.com/homepages/andrew_lea/content2.htm
The press juice then needs to be collected in another container and at this point it is convenient to measure its sugar level, acidity and pH so that blending may be corrected with other batches of juice pressed on the same day. A fair amount of sugar still remains in the dry press-cake (or 'pomace') so by adding a litre or two of water to each 5 kg of broken-up pomace before re-pressing, a useful yield of slightly weaker juice may be obtained, which is usually added to the first pressing.

Previously we described the composition of the ideal cider fruit in terms of materials such as sugar, acid and tannin. Sugar levels are set largely by the weather - in a good summer we might expect them to be as high as 17%, but in a cool wet summer less than 10% might be achieved. The sugar levels can be measured directly on a drop of juice squeezed out from the fruit, using a hand held refractometer. This equipment is expensive (ca £70), but is often used by grape-growers, who need to measure sugar content daily as harvest approaches. For cider-making, the changes in sugar levels are not so critical and the fruit will usually have been stored for a while to convert all the starch into fermentable sugar anyway. So it is usual to measure the juice 'specific gravity' (S.G.) after pressing, using a hydrometer, which is much cheaper (ca £5) and available from 'Boots'. Roughly speaking, 15% sugar corresponds to an SG of 1.070 and a total potential alcohol of 8.5 %; 10% sugar is SG 1.045 and a potential alcohol of 6%. If the juice S.G. is less than 1.045 and you have no sweeter juice for blending, it should be brought up to this level by the addition of sugar or apple juice concentrate. Otherwise the resultant alcohol level may not be sufficient to protect the final cider during storage. To raise the S.G. in 5ø steps, dissolve 12 - 15 grams of sugar in each litre of juice and re-test with the hydrometer until the desired level is reached.

Acidity and pH

The acidity is controlled more by the variety of fruit than the climate. Acidity has two aspects - total acid and pH - and both are useful to know. The total acid relates well to our perception of acid flavour, while the pH relates better to various aspects of fermentation biochemistry. These two are connected but not in a simple way, although the acidity always goes up as the pH goes down and vice-versa. In terms of total titratable acid (as malic), we should be looking for 0.3 - 0.5% in a cider juice. If the total acid is too low, the pH will be too high and the fermentation will be susceptible to bacterial infections. If the total acid is too high, the pH will be low enough to safeguard against infection but the final cider will be unacceptably sharp to the palate and may never be pleasant to drink. Acidity can be measured by titration - details will be found in any good wine-making book. Kits for measuring titratable acidity are available in the wine-making section of 'Boots'.

Measurement of pH has to be done by a dedicated 'pH meter'. These used to be very expensive, costing several hundred pounds, but modern 'chip technology' has now brought them down to the range of £30 or so. However, beware the very cheap pH meters which are sold in garden centres for soil testing - these are not accurate enough for cidermaking because we need to measure to at least the nearest 0.1 pH unit or it is not worth making the measurement at all! A desirable juice pH range for cider-making is say 3.2 - 3.8. At higher pH the fermentation will be subject to microbial infection and at pH 4.0 or above this can lead to serious flavour problems. Many traditional bittersweet cider apples tend to be high in pH which is why they need blending with more acid fruit, preferably before fermentation. That is one reason why bittersharp apples, such as 'Kingston Black', have been regarded as near perfection in terms of their composition for single-variety cider making.

If you cannot measure the acidity or the pH, taste the juice instead. Trying to ignore the sweetness and the tannin, judge whether the juice is insipid, balanced or sharp. If insipid, and you have no other juice for blending, malic acid may have to be added in steps of 1 gram per litre (0.1%) until the balance is improved. If the juice is too acid, and you cannot blend it out, you may have to encourage a malo-lactic fermentation to reduce it (see later), or you can add a little calcium carbonate to neutralise it, in 1 gram per litre steps. Malic acid and calcium carbonate (as 'precipitated chalk') are also available from 'Boots' (note that citric acid may lead to bacterial flavour defects in the final cider and should not be used unless malic acid is completely unavailable).

Other juice parameters, such as tannin, are difficult to measure, but only people using a high proportion of bittersweet fruit are likely to suffer from excessive tannin and this can usually be detected by taste although the juice sugar does tend to mask it. Deficiencies here can be corrected after fermentation, however. The purpose of blending before fermentation is to give a juice as close in composition to the 'ideal' which was described in the previous article. Although this may not always be possible, it is always worth the attempt at least in terms of sugar and acid levels. Blending after fermentation is a worthy and useful art but it cannot correct a gross biochemical imbalance beforehand!

Juice preparation

Apart from the blending corrections described above, you can of course always add sugar, glucose syrup, synthetic malic acid and apple juice concentrate to any desired extent along with water. On a commercial scale there are considerable cost advantages to be be gained by doing so, since sugar and water are much cheaper than apple juice, but these have to be weighed up against the ultimate quality of the cider you wish to make. Excessive dilution will make the cider 'thinner' in its overall complexity of flavour and cannot be recommended for a high quality product.

The blended juice should now be strained through a coarse plastic mesh into a suitable clean vessel for fermentation, and at this point a number of other additions may be made. If it is important that the final cider should be sparklingly clear, a pectolytic enzyme may be added, which will help to ensure that all the pectin is broken down. Pectin is a sort of natural glue which sticks the apple cells together. Although it is water-soluble it is precipitated by alcohol, so it tends to lead to persistent hazes by the end of fermentation. Dessert fruit, or long-stored fruit, tends to suffer more from pectin release than does bittersweet fruit and will often give a very cloudy cider unless depectinised. Although there are natural enzymes in both apple and yeast which will break down the pectin during fermentation, these enzymes are often rather weak and require some assistance. The dosage rates for the commercial enzymes are given by the suppliers - small quantities are available from 'Boots' and larger quantities from specialist suppliers (see list at the end of this article).

The next addition is that of vitamins and yeast nutrient. These may be bought as such or may be added as thiamine and ammonium sulphate (or phosphate) respectively. The dosage rate is up to 0.2 milligrams per litre of thiamine and up to 300 milligrams per litre of ammonium salt. This is what was meant by 'amino nitrogen' in Table 1 of the previous article, and it is needed by the yeast to make protein and amino acids for its own growth. (This is not unlike human and animal nutrition - the yeast's carbohydrate or energy source is of course the apple sugar which is not in short supply!) Apple juices are generally very low in yeast nutrients (unlike beer worts or grape musts) and so your fermentation rate will probably be much improved if you add these. The fermentation is also much less likely to 'stick' or to grind to a halt before completion. The cider can therefore be racked and bottled sooner, reducing the chances of spoilage in store. On the other hand, it is undeniable that some of the finest ciders are fermented very slowly without the addition of nutrients, but the risks of failure are correspondingly greater. You pays your money and you takes your choice! Traditional cider-makers used to hang a leg of mutton or a side of beef in the fermenting vat to boost the nutrient levels. The meat broke down slowly in the acid juice, releasing soluble amino nitrogen which the yeast could use for growth. The supposed requirement of a few dead rats in every vat is a more colourful manifestation of the same idea!

Sulphur Dioxide

The next addition is that of metabisulphite, sulphur dioxide or SO2, which are all synonyms for the same thing. This topic always inflames great passions amongst the purist cidermaking lobby, who regard it as dancing with the devil - perhaps it is the connection with brimstone which worries them! However, it has a long and honourable history and the use of burning sulphur candles as a sterilant in wine-making is supposed to date back as far as Homer. Certainly it was in use for cider-making from Elizabethan times, and the controlled addition of metabisulphite is far more accurate than the haphazard application of sulphur candles could ever be.

In simple terms what happens is that the sulphur dioxide inhibits the growth of most spoilage yeasts and bacteria, while permitting the desirable fermenting yeasts (such as *Saccharomyces cerevisiae* or *uvarum*) to multiply and to dominate the conversion to alcohol. Only small amounts of sulphur dioxide are used, and its effectiveness depends on the pH of the juice. The Table shows the appropriate levels to use when a cultured yeast is being added for the fermentation. Lower levels are needed if a 'wild' *Saccharomyces* fermentation is required (see below), or there is a danger that all the wild yeast will be killed. In the absence of sulphur dioxide, the fermentation is much less likely to be 'clean' although with care it is possible to do without it. A great deal of the concern about sulphite derives from its excessive use at bottling not during fermentation, and from the fact that a very few people are hypersensitive to it in the free state. However, it must be stressed that no sulphur dioxide remains free by the end of fermentation, since it becomes bound to various intermediate chemicals (principally acetaldehyde) which the yeast produces on its route from sugar to alcohol. I would always advise the beginner to use sulphur dioxide to minimise the risk of taints and infection. Later on, the experienced cidermaker can omit it at his discretion and see what difference it makes.

Addition of Sulphur Dioxide		
Juice pH	**SO2 needed in parts per million (ppm)**	**Campden Tablets per gallon or ml. of 5% SO2 stock solution per litre**
Above 3.8 (insipid)	.....Lower pH to 3.8 with addition of malic acid.....	
3.8 - 3.5	150	3
3.5 - 3.3 (balanced)	100	2
3.3 - 3.0	50	1
Below 3.0 (sharp)	None	None

Notes

1. If a pH meter is not available, use the taste of the juice as a guide

2. To make a 5% stock solution of sulphur dioxide, dissolve around 10 grams of sodium or potassium metabisulphite in 100 ml of water. (The metabisulphite salts contain around 50 - 60% of available SO2 depending on how they've been stored). Then 1 ml of this per litre of juice (5 ml per gallon) corresponds to 50 ppm (parts per million) of SO2.

3. Campden tablets are formulated with metabisulphite to give the equivalent of 50 ppm sulphur dioxide when each is dissolved in 1 gallon of liquid.

The Yeast

This brings us to the final addition, that of yeast. There are so many good dried wine-making yeasts on the market today that it is well worth considering their use. All of them will get a fermentation off to a good start within hours, by providing a massive inoculum of healthy yeast cells which will multiply quickly and swamp out anything undesirable. Some of these are more cold-tolerant than others and are capable of fermenting even down to 5ø C, which can be a great boon to a British cidermaker whose raw material may not be ready until early November. Some yeasts claim to confer specific flavours e.g 'Burgundy', 'Champagne' but these claims should be taken with a pinch of salt and in any case are probably not relevant to cidermaking. Stick to a good general purpose wine yeast - not a brewer's yeast and never a baker's yeast, since these have been selected to have other properties which we do not require. There is no need to select a yeast with a high alcohol tolerance since the natural sugar of apples will rarely produce more than 8% alcohol. If you fortify significantly with sugar and you want alcohol levels up to 12%, then you are making apple wine - not cider! Large commercial cidermakers do just that (known as 'chaptalisation') and then dilute the cider with water for retail sale, but this series is not concerned with that sort of business.

For small quantities of branded wine yeasts, 'Boots' is again a good bet (and, no, I don't have shares in the company!). On a larger scale, you can buy specific strains of *S. cerevisiae, bayanus* or *uvarum* which are mostly produced in Central Europe by firms such as Novo and Siha for the wine and fruit wine industry there. These are available through UK agents (see address list). Generally the yeast is grown up overnight as a 'starter' in sterile juice or sugar solution, and then pitched into the main bulk the next day. If sulphur dioxide is used, it is very important to wait overnight before adding the yeast culture. This is because the sulphur dioxide needs time to act against the wild organisms, and it will also inhibit the added yeast too strongly if they are all added together. By standing overnight, the free sulphur dioxide largely disappears once its work is done, giving the added yeast a chance to get away without significant inhibition.

Fermentation should commence within 48 hours if an active yeast culture is used. As an alternative, it is possible to rely on the few natural *Saccharomyces* yeasts which will be present in the juice after sulphiting, and allow them to multiply to sufficient levels to start the fermentation, but this may take up to a fortnight. If neither sulphite nor yeast are added, the juice will probably start to ferment within a day, but the wild yeasts which multiply under these conditions cannot be guaranteed to produce desirable flavours. In any case, they will begin to die after a few days as the alcohol level rises, leaving the fermentation at the mercy of any other dominant organism which has been able to establish itself. If you are lucky, this may be a useful *Saccharomyces* species - if you are unlucky, you have only yourself to blame!

In summary, therefore, I recommend the beginner to use a pectolytic enzyme, to use sulphur dioxide and to add a cultured wine yeast after standing overnight. You can perhaps skip the nutrients unless the fermentation begins to 'stick' or unless you know that your fruit comes from big old trees with very low nutrient levels and you are not prepared to wait a few months. The progress of the fermentation should be monitored every few days with a hydrometer and the fall in S.G. plotted on a graph against time (a fall of one degree S.G. per day is pretty reasonable). This makes it much easier to see whether sticking is occurring, and the nutrient and vitamin can be added then if necessary.

Conduct of the fermentation

In the initial stages of fermentation, there is considerable frothing and evolution of carbon dioxide as the yeast multiplies and begins to break down the sugar into alcohol. There may be as many as 10 million yeast cells per single ml. of juice at this stage, so it is easy to understand that there is a lot of microbiological activity going on! A loose plug and the outpouring of gas will probably ensure that nothing undesirable can creep back into the fermentation vessel, be it a demijohn, a barrel or a 5,000 gallon stainless steel tank. When the initial frothing subsides, however, it will be worth topping up the vessel with a 10% sugar solution and fitting a fermentation lock to ensure that the flow of gas remains one-way. As you follow the drop in S.G. with time, it will begin to level off and you should consider the first racking of the cider from its yeast at an S.G. of 1.005. If it stops fermenting at an S.G. much higher than this, then it may be 'stuck', and nutrient addition together with twenty minutes vigorous aeration may help the yeast to grow again (the yeast does need some oxygen for growth). It may also stop if the temperature falls too low, but this should need no attention from the cidermaker. When the weather warms up again, the fermentation should re-commence. In fact, a cool fermentation (ca 15ø C) is generally preferred for cider and there is no need to keep the fermentation especially warm.

If the cider is particularly acid at this stage, the first racking may be delayed for a month or so to encourage the 'malo-lactic fermentation' which is described below. In general, however, it is bad practice to leave a fully fermented cider on its yeast lees for more than a few weeks.

The first racking should be into another clean vessel, trying to leave behind as much yeast as possible and with the minimum of aeration to the cider. This is generally done with a clean plastic syphon tube fixed to a wooden rod so it rests just above the yeast deposit or, on a larger scale, with a suitable pump. The transferred cider should be run gently into the bottom of the new vessel without splashing. Now that there is much less carbon dioxide to protect the cider, it is important to minimise the headspace and to prevent air contact as much as possible. This is partly to keep out any undesirable film yeasts or bacteria, and partly to prevent 'oxidation' which leads to flat dull flavours and a loss of freshness. This is why some people add 50 ppm of sulphur dioxide at every racking, although at the first racking this is probably unnecessary because of the remaining carbon dioxide. Sulphite added at this stage will almost certainly inhibit the malo-lactic fermentation, which may or may not be required (see below).

Maturation and Bottling

After the first racking the air-lock is re-fitted until it is clear that gas evolution has ceased, when the vessel should be topped up with water or cider and tightly closed. A second crop of yeast will be thrown as the cider settles down. The cider may remain in this state for several weeks or months, before a final racking to a closed container for bulk storage or directly into bottle. It is important that it should not sit for long on a heavy crop of yeast, because the dead yeast will 'autolyse' which tends to give unpleasant flavours. However, a small amount of autolysis from the second crop may be helpful, because this releases nutrients which stimulate maturation through the so-called 'malo-lactic' fermentation. This phenomenon is due to a specialised group of bacteria (*Lactobacillus* or *Leuconostoc* species) which convert the malic acid of the apple to lactic acid, giving off more carbon dioxide in the process. Often, this happens in the spring when the trees are flowering, giving rise to the notion that somehow the trees and the cider are working in sympathy! Generally the malo-lactic fermentation is to be welcomed, since it lowers the acidity and gives additional rounder smoother flavours, although in very low acid ciders it can reduce the acidity too far. In bittersweet ciders it produces characteristic 'spicy' notes (often detectable in ciders from Normandy). It may be recognised by the evolution of gas without renewed turbidity (if a yeast re-ferments a sweet cider it becomes cloudy because the yeast cells are so large (typically 10 microns). Malo-lactic fermentations, unless very heavy, tend to remain clear because the bacteria are so small (typically 0.5 microns).

The malo-lactic fermentation is difficult to produce at will although some strains of lactic bacteria are now available commercially for use in the wine industry. It may definitely be prevented by the additional use of sulphur dioxide at racking. Sometimes it reduces the acidity too far and sometimes the 'wrong' organisms take hold, producing other defects such as 'ropiness' (which will be covered in a later article). But if the original juice pH was no higher than 3.8, the chances are that this fermentation will be beneficial if it happens at all. Even if it does not, the cider will mature for several months as its flavour balance stabilises and the harsher notes are smoothed out by slow chemical and biochemical reactions.

However, ciders do not generally profit by extended ageing and by late spring or early summer the cider will be ready for bottling and drinking, or for a second racking into bulk store. The golden rule at this stage is to minimise air contact whenever the cider is handled - it is a matter of preference whether you wish to add sulphur dioxide (ca 50 ppm) to help with this, but in any case you should not exceed a total addition of 200 ppm SO_2 to any cider when all additions at fermentation and bottling are summed up. A dry cider with no added sugar and sufficient alcohol should be quite stable in clean, closed and well-filled bottles, and should stand a minimal risk of any unwanted conversion to vinegar!

Alternatively….

Simple Cider (to make 4.5l)

A very easily made dry cider which is slightly acidic to the taste and can easily be adapted/modified as required, I find adding the petals of an aromatic, fully opened rose, picked on a good sunny day, can be added around day 4, giving a little subtlety to the bouquet and flavour.

Ingredients:-

4l Apple juice
50g sugar (see Notes below)
5g (1tsp) Pectic enzyme
2.5g (1/2 tsp) yeast nutrient **
Wine yeast (white Champagne is best but any will do, even red)

1) Pour 1l of apple juice into a demijohn, add the sugar after dissolving in a small amount of warmed water (250ml or less), add the pectic enzyme, yeast (** nutrient need not be added as the juice should contain sufficient).
2) After 1 day add 1l apple juice, repeat on days 3 & 4. All the juice could be added on day 1 but this gradual process possibly gives more flavour.
3) On the last day make up to about 4.7l (this allows for wastage).
4) Rack when finished.
5) Bottle in plastic "pop" bottles with 1 rounded tsp sugar per 500ml & keep warm for a few days for the bottles to get "fat" with the secondary fermentation.

6) Store somewhere cool for at least a month before trying.

Notes:- This cider would typically have an O.G. of around 1040 and a F.G. of 1000, giving about 5.8% ABV (including the priming sugar) and 0.74% acidity. For a less acidic cider the apple juice can be reduced to 3l and the sugar increased to 150g.
Stronger versions can be produce by adding extra sugar during stage 1, each extra 50g of sugar provides about 0.5% alcohol but do not sacrifice quality for alcoholic strength!