Leeks, cabbage and chips

For almost 30 years, plant substrates and growing media have been produced and mixed on site at Tolhurst Organic Partnership C.I.C. at Hardwick, Pangbourne. During continuous adaptation and experimentation with various ingredients over the years, Tolly has found a composition of materials that is reliably producing healthy and strong transplants. This mixture is largely based on woodchip compost which is produced on site and has now been used successfully in transplant raising for many years on his holding. But now Tolly wants to find out how his growing medium is performing compared to commercially available substrates.

As peat builds up over millennia through accumulation of partially decayed vegetation and organic matter, it is effectively a non-renewable resource with a very high carbon footprint. However, as a growing medium, peat is still very widely used in the conventional and organic horticultural sectors; mainly as it retains moisture and supports nutrients effectively. In the UK, Defra aims to phase-out the use of peat in all horticultural systems by the year 2030, making it essential to identify suitable materials as replacement. Regardless, many growers want to move towards using more locally available resources with a lower carbon footprint.

Tolly with the raw material - woodchip compost

To answer Tolly's question, "*How does woodchip compost perform as a peat free growing medium compared to standard substrates?*" he set up a small-scale trial in early spring 2014, funded by the Duchy Originals Future Farming Programme. The trial compared the following growing media mixtures:

1. Woodchip compost produced on-site. The woodchip is composted for about 12-18 months, then sieved to remove any remaining larger wood pieces and enriched with vermiculite and lime.

2. Klasmann growing medium, a standard growing substrate for certified organic production ('KKS - Kompost Kultur Substrat') which contains peat, coir, green waste compost and organic fertiliser.

For substrate **3.** and **4.,** both woodchip and Klasmann media were enriched 10% v/v with Biochar Soil Improver (in the following referred to as Biochar) which contains biochar, mycorrhizae, wormcasts and seaweed.

In all four substrate mixtures, cabbage and leek transplants were raised in a replicated and randomised trial design; first in the greenhouse and later in the field. After growing the seedlings in the greenhouse for the first weeks, they were planted out in April. The performance of the plants was assessed throughout the entire growing period based on growth, health, yield and quality of the end produce.

Field lab events

Three field labs were scheduled throughout the duration of the trial, making it possible for interested growers to follow its developments, hear about other grower's experiences and to give feedback and input to the experiment. The first field lab was held in late February 2014 and introduced the trial, its methods and aims to the group. During a workshop in the afternoon, Tolly gave an overview of the production of compost generally and the production of woodchip compost on his holding. The workshop motivated some growers to test other materials for their own substrate mixtures and some had set up their own small trials during the growing season.

At the second meeting in the first week of April, the transplants were fully developed in the growing trays, with the cabbage plants almost ready for planting out in the field. The first findings were discussed in the group, and Tolly gave some feedback on the trial design and on setting up experiments in general.

April field lab looking at the trial transplants in the greenhouse

Photos: Phil Sumption/ORC

At the third meeting in the last week of September, the outcomes of the trial (pest and disease occurrence, yield results, etc.) were presented and discussed in the group. Very useful feedback was received from participants and alternative options for producing and mixing your own growing media were discussed; for example, the small experiment of Pauline Pears, who achieved positive results when comparing leaf-mould compost with

Photo: Anja Vieweger/ORC

Cabbage trial set-up in the field. Plants raised in the four different growing substrates were planted in four rows, with two guard rows on either side to buffer any occurring edge-effects.

'organic' (non-certified) growing substrate (New Horizon) for brassica transplants. The meeting also reflected on the methods best chosen for such small trials and experiments; on one hand to maximise the reliability of results and on the other hand to maximise the efficiency of the invested labour and money.

During the growing season

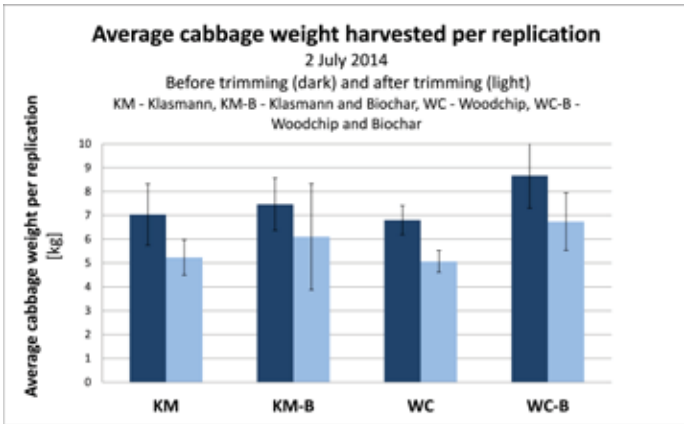
Whilst the cabbage plants did not show any major differences in growth during the first weeks after sowing, there was some effect in the leek plants. Those grown in Klasmann substrate (with and without added Biochar) seemed to have grown quicker and on average a longer (2-4 cm) shoot length was measured. An effect, which was, however, levelled out later in the field, as six weeks after planting, the other plants had caught up in shoot length and no differences were seen anymore.

Tolly monitored pests and diseases during the entire growing period and in both crops (apart from the odd slug) found no notable infestations. For this reason, it was only at harvest that pathogens were systematically evaluated, and the results are shown in the following data. None of the described diseases, however, had a negative effect on the saleability of the product.

Effects on crop yield and quality

The average cabbage weight and quality was assessed during harvest. For this, three harvest windows were marked out in each row (12 windows in total) where the weight of the harvested cabbages before and after trimming was assessed. There was no significant difference noticeable in the data; the graph shows the measured results. However, as a trend, it became apparent that the cabbages raised in substrates with added Biochar produced slightly heavier/larger cabbages, particularly those plants raised in woodchip compost with Biochar.

Also when comparing the quality of the yield, there were no apparent differences between the four variants; the average quality ranked by Tolly ranged between 7 and 8 out of 10. Also with regards to his rating of slug damage, no significant differences between the four substrates were found. A scale of 0 to 10 was used, with 0 standing for no damage and 10 standing for very high slug damage. However, a slight trend towards a higher number of the pest occurrence in plants raised in substrates with added Biochar was seen; and the range of numbers within these replications was larger.



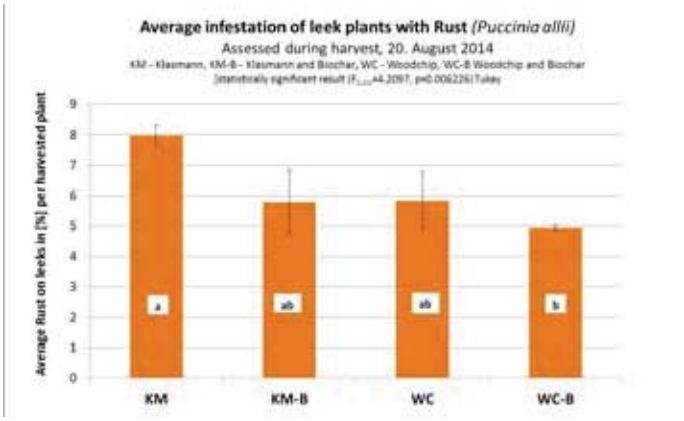
Average cabbage weight in the four different rows at harvest

Similar to the cabbage harvest, leek harvest windows of three metre length were marked out as shown in the photo below. The plants were loosened with a fork, pulled out with the roots and freed of any attached soil. The stalks of each replication were then weighed and assessed for fungal diseases and quality. After all assessments were completed, the stalks were trimmed and weighed again for the total saleable yield.

Photo: Anja Vieweger/ORC

For the leek harvest, windows of 3 metre length were marked out

All results found here in the field have to be evaluated with great caution. After a long growing phase in the soil, where all plants had similar or comparable conditions and nutrient supply, it is difficult to draw conclusions on the specific reasons for the found differences, and attributing these solely to the growing media of the transplants cannot be done with certainty and would need more in-depth research. However, it is still very interesting to follow the crop all the way through to



Infestation of leeks with Rust (Puccinia allii) at harvest. (Variants with different letters are significantly different from each other.)

the end of the growing period and to monitor any changes in the different treatments. Many trials comparing different growing media do not consider later effects in the field (e.g. carried-on robustness, resilience etc.). This trial can be seen as initial work for future, more detailed research in this area; it revealed some interesting results that could be picked up on in more in-depth experiments, for example assessing long-term effects of woodchip composts on crop tolerance against fungal diseases.

Conclusions

The trial was set up on a small scale, aiming to represent 'average' and comparable conditions of farmers' own trials and experiments. It has reached over 50 growers, advisors and other interested stakeholders, inspiring them to try producing their own compost or growing medium, or to compare alternative substrates for their own business. Within the constraints (financial, labour, space, etc) of this one-season experiment, very useful results were found, and a small network of enthusiastic and engaged growers and advisors has formed, who hope to exchange knowledge and experiences on this subject in the future.

Possibilities and approaches of trialling new products or methods on a small scale, specifically tailored for the circumstances of a holding or business, were demonstrated and discussed. As for farmers' own trials in general, it is highly important to find a suitable balance between scientific research approaches/rigour and site-specific, practical and feasible experimental methods. Within limited budgets, for example, it is not always possible to cover all potential influences and aspects of the evaluated research question. It is, however, possible to address prioritised aspects and specific needs focused on the site, providing a valuable basis for decision-making on future investments or strategies.

In this case, the trial has revealed clear results that the tested woodchip compost can be successfully used to replace the commercial growing substrate containing peat. The comparisons have shown that growth, health and even yield of the assessed crops were comparable, with only little differences in weight or quality (in some cases the plants raised in woodchip compost and Biochar performed better than the control). Although woodchip composts may have some disadvantages with regards to weight/structure or water holding capacity (it requires a slightly different treatment with regards to water and nutrient management), with adapted management strategies, the same and even better results can be achieved in transplant-raising. These results suggest that woodchip compost can provide a good alternative to commercially available, peat-based growing media.

Anja Vieweger

For the full report go to:

http://www.soilassociation.org/innovativefarming/duchyoriginalsfuturefarmingprogramme/fieldlabs

OGA picture quiz Xmas 2014: Answers

1. It's a courgette. Also known as zucchine lunghe
2. Japanese or oriental bunching onions, *Allium fistulosum*
3. Caigua or achocha *Cyclanthera pedata* (pictured: achocha fat baby)
4. Daikon (in Japan) or mooli (South East Asia – mooli is the Hindi name), *Raphanus sativus*
5. Sage, *Salvia officinalis*
6. Cannabis or hemp. Cannabis sativa
7. (d) Concorde is a pear, all the others are apples
8. Kohl rabi, *Brassica oleracea*
9. Gina Lollobrigida. Born Luigina Lollobrigid 1927 in Subiaco, Lazio, Italy
10. (d) Golden Noble is a cooking apple – all the rest are pears
11. Jerusalem artichoke. The Italian for sunflower is girasole which it is claimed mutated to Jerusalem. Other explanations are available!
12. (a) Fly agaric, *Amanita muscaria* is an hallucinogenic fungus and is generally regarded as poisonous. All the others are edible mushrooms.
13. I'm a Tree Tomato or tamarillo, *Cyphomandra betacea*