Comfrey vs Nettle feeds

Summary

Background

It is easy to make liquid plant feeds by soaking plants such as comfrey or nettles in water for a few weeks.

There is lots of information in gardening literature and forums that states that comfrey liquid is high in potash so is good for feeding fruiting plants such as tomatoes, whilst nettle liquid is high in nitrogen so is good for feeding leafy crops. However, there is a lack of work that backs this up rigorously. There is very little work that makes a direct comparison between nettle and comfrey feeds produced under similar conditions.

Aim

The aim of this experiment was to test the differences in plant nutrient content between pairs of comfrey and nettle feeds grown at a range of locations around the UK to allow a fair comparison to be made.

Key findings

- Preparing a nettle or a comfrey feed by soaking the leaves in water for 1 month produced a feed that had a similar nutrient content to a commercial tomato feed. It should be used undiluted.
- Feeds made from nettles had more nitrogen than the comfrey, but the differences in potassium were only small and not statistically significant. Both nettle and comfrey produced a liquid that had a high potash content that would make it suitable for feeding tomatoes. If you only have a patch of nettles to hand, this would make a very good tomato feed.
- Brewing for longer than 30 days did not increase the nutrient content of the plant feed produced.
- There was considerable variability in the nutrient content of liquids obtained from different sites.
- Feeds made from compressing leaves were extremely variable and some had very high potash content relative to other nutrients. This makes it difficult to give advice on how to dilute them and how much to use.

Introduction

Comfrey is a perennial plant in the Boraginaceae family. It is native to Europe and often found growing in damp locations such as river banks and ditches (Fern, 2024; Hills, 2011).

Comfrey can be thought of as one of the green pillars upon which Garden Organic was formed in 1958. Long before this, there have been many mentions of this versatile plant. One of the earliest references was made in Turners Herball (1568) as a cure “for them that spitte bloode” and “to glew together freshe woundes”. The comfrey plant has since been put to many uses such as a livestock feed (Oster et al., 2020; Wilkinson, 2003), a liquid plant fertilizer (Govere et al., 2011) and various medical uses such as healing wounds (Frost et al., 2014; Staiger, 2013). One of the useful properties of comfrey, is that it accumulates large amounts of minerals, especially potassium, in the leaves (Oster et al., 2020; Tyler & Zarro, 2021). This makes it useful material for using as a soil or liquid fertiliser.

It was in 1948, that Lawrence Hills first started working on comfrey. He was interested in developing the plant for a number of uses including its potential as a high yielding, high-protein fodder crop for animals and its properties as a plant feed. In 1958, the Henry Doubleday Research station trial site was set up on ¾ of an acre of ground in Bocking, Essex, rented for a fee of £10 per year. He collected strains of comfrey from farmers and growers, characterised and tested them for their value as a plant feed and a livestock feed. The strains that he identified, he gave the name ‘Bocking’ and a number. From this work, two cultivars remain popular today. Bocking 14 was the best as a plant feed, and Bocking 4 was more suitable for feeding livestock.

It is his work using it as a plant feed that has had the most long lasting impact on gardeners. His work showed that comfrey leaves when wilted have a similar nitrogen and phosphate content to farmyard manure but around four times the potash content. When made into a liquid feed, it produced a liquid with similar nitrogen content, slightly lower phosphate content, and around three times the potash content of a proprietry liquid feed. His work showed that it was possible to produced a viable cost-effective feed with a low ecological impact (Hills, 2011).

Since then, there have been few published analyses of liquid feeds. Gardening articles frequently state that comfrey liquid feeds are high in potash so are suitable for tomato crops, whilst nettle feeds are high in nitrogen so suitable for rapid growing leafy crops. However, there is a lack of studies which compare comfrey and nettle feeds grown directly under similar conditions at the same site. This work compares pairs of comfrey and nettle feeds sampled from sites around the UK, and tested whether some of the claims made in gardening texts can be backed up by directly comparable measurements.

Aims of this experiment

The aim of this experiment was to test the differences in plant nutrient content between pairs of comfrey and nettle feeds grown at a range of locations around the UK.

This would allow us to:

a) Examine the differences between comfrey and nettle grown under similar conditions
b) Examine the variability of comfrey and nettle liquids grown at different sites

Methodology

Making comfrey and nettle feed

Comfrey and nettle feeds were prepared either using a Garden Organic standard method or people used their own method and recorded the amounts of liquid and how long it was infused for. Some people used a compression method to extract a more concentrated liquid rather than adding water.

Garden Organic standard method (after (Hills, 2011))

Comfrey feed

1. In early June, 1 kg of comfrey leaves was cut
2. This was pressed down weighing down with a brick if necessary
3. The mixture was topped up with water to make 15 litres
4. The bucket was covered and left to brew until mid-July for sampling

Nettle feed:

5. The above procedure was repeated using 1 kg of nettle leaves

Sampling:

-
    6. On the 17th July (or as close as possible to this date), the liquid was stirred and a sample taken from both the comfrey and nettle liquid feeds and placed in separate labelled tubes.
    7. Samples were posted back to Garden Organic immediately, using a padded envelope.
-

Analysis

Coventry University carried out the analysis of the liquid samples.

Statistics

- The differences between the comfrey and nettle liquid were analysed using a paired t-test with each pair representing comfrey and nettle liquid taken from the same site.
- P values where expressed, represent the probability of those differences occurring by random chance, so where the value that is less than 0.05, the effect of the treatment is considered significant.
- Compact letters were assigned to results, those that were significantly different were assigned different letters.

Results

There were differences between the nettle and comfrey feed but these differences were much less than the variability between different sites.

Comfrey and Nettle feeds made using with water.

A comparison was made of nitrogen, phosphorus and potassium levels in liquids extracted from comfrey and nettles grown by members at a range of sites. It was possible to compare 19 paired samples from participants who had prepared both comfrey and nettle liquids on the same site using the Garden Organic water extraction method described in the methodology.

Nettles produced a feed that was significantly (p= 0.0107) higher in available nitrogen (ammonium and nitrate) than the comfrey liquid. On average, it was around 50% higher, in nettles than in comfrey. This is in accordance with much of the information in the gardening literature that nettle feeds contain more nitrogen than comfrey. It is also consistent with measurements taken by Tyler & Zarro (2021) showing that nettles had a higher concentration of nitrogen in the leaves than comfrey.

The phosphorus content in the nettle liquid was 38% higher than the comfrey liquid, which was significantly (p= 0.0301) different. There is little information in the literature on the differences of this nutrient between nettle and comfrey. The one study found (Tyler & Zarro, 2021) showed little difference in phosphorus content of nettle and comfrey liquids.

The potassium content in comfrey liquid was 8% higher than the nettles – this difference was not significant. This difference is smaller than that suggested by current gardening advice that comfrey is much higher in potassium than nettles. Tyler & Zarro (2021) also found that comfrey liquid contained 50 – 60% more potassium than nettles.

Table 1 Nutrient concentrations (mg / L) of samples soaked in water from 19 paired samples

	Nitrogen		Phosphorus		Potassium	
	Mean	Range*	Mean	Range*	Mean	Range*
Comfrey	97 [a]	52-133	40 [c]	31-47	551[d]	426-707
Nettle	153 [b]	98-197	55 [c]	40-60	507[d]	354-640

* The interquartile range is presented here to exclude outliers, so 50% of the results fell within this range

Measurements with different letters are significantly different at the p=0.05 level.

The average concentration of nutrients from the liquid feeds measured here equates to a ratio of 4:2:10. This ratio is quite similar to the common garden advice that suggests that a ratio of 4:3:8 makes an ideal feed for growing tomatoes (eg Trinklein, 2014). The high potash concentration is thought to be particularly suitable for developing flavour and yield in tomato crops (Javaria et al., 2012; Winsor, 1966). It is interesting that, in this case, a feed suitable for tomatoes could also be created using nettle liquid.

Comparison with other feeds

The table below shows the results obtained by Lawrence Hills (Hills, 2011) and compared to typical commercial tomato feed using data from a manufacturer data sheet.

Table 2 Nutrient concentrations (mg / L) of samples from Lawrence Hills and commercial feed

	Nitrogen	Phosphorus	Potassium
Comfrey (from Hills, 2011)	140	59	340
Typical commercial feed from manufacturer data sheet when diluted for use	178	58	293

It showed that the feed produced from comfrey liquid created using the water extraction method was very similar to a commercial plant feed. The results in this experiment were in the same ballpark to Lawrence Hills results, although with slightly lower nitrogen and higher potassium.
It demonstrates that the undiluted comfrey and nettle liquid feeds contain a similar composition of nutrients to a commercial feed that has been diluted ready for use.

Variability between sites

Soil type

There was a lot of variability between sites. In this study, virtually everybody grew their comfrey on heavier textured soils, so it was not possible to examine the effects of soil texture on nutrient concentration. However, other aspects of the soil and environmental conditions may have contributed to the variability. Many other studies that show that plants grown on different soil types have different nutrient contents in the leaves and generally plants grown on heavier clay soils generally show higher nutrient contents. (He et al., 2015; Makus & Lester, 2002).

Duration of brewing

Everybody brewed for 30 days or longer in this study. The length of time for brewing had no effect on the concentration of N, P or K in the comfrey and nettle liquids, so brewing for 60 days did not result in a more nutrient rich nutrient solution than one brewed for 30 – 40 days. This is in accordance with Govere et al., 2011 who also found that brewing periods longer than 30 days did not increase the nutrient content.

Comfrey feeds made with compression

A comparison was also made of nitrogen, phosphorus and potassium levels in liquids extracted from comfrey and nettles grown by our members at a range of sites using a compression method. It was possible to compare 12 paired samples from participants who had prepared both comfrey and nettle liquids on the same site.

There was a lot of variability, between sites in the compressed samples, so any differences between the comfrey feed and the nettle feed may not be significant and should be interpreted with caution.

It is interesting that these compressed samples had a very different balance of nutrients compared to those soaked in water. The standard advice is for compressed liquids is that they need to be diluted 1 in 10 (Garden Organic, 2023). However, with this high degree of variability, it is difficult to know whether you are diluting it be the right amount. It also gave a feed that is very high in potassium compared to the amounts of nitrogen and phosphorus so makes an unbalanced feed. The ratio of nutrients was approximately 4:2:40 which is very different from the 4:3:8 ratio recommended for growing tomatoes (Trinklein, 2014).

Table 3 Nutrient concentrations (mg / L) of samples made using a compressed feed from 12 paired samples

	Nitrogen		Phosphorus		Potassium	
	Mean	Range*	Mean	Range*	Mean	Range*
Comfrey	176[a]	36-145	106[b]	44-132	2455[c]	702-4852
Nettle	186[a]	20-238	63[b]	17-96	1428[c]	360-1437

* The interquartile range is presented here to exclude outliers, so 50% of the results fell within this range
Measurements with different letters are significantly different at the p=0.05 level.

Conclusions

- The concentration of nutrients in the home-made liquid feeds were ready to use commercial feeds, so comfrey or nettle liquid prepared with water doesn't need further dilution.

- The nettle feeds had a similar composition to the comfrey feeds, and were high in potash, so would also make a good tomato feed, contrary to some garden advice.

- Variability of the plant feeds can be caused by many factors especially soil conditions and age of plants leaves. To maximise the nutrient concentration of your feed, use younger leaves and remember that the soil will need feeding to replace the nutrients drawn out by the comfrey or nettle plants.
-
- The concentrated feeds made from compressing leaves were very variable and had a high concentration of potassium compared to other nutrients. This would make it difficult to make recommendations as to how much to dilute or how much to apply.

Acknowledgements

We would like to thank the Centre for Agroecology, Water and Resilience at Coventry University for analysing the nutrient content of the liquid feeds.

References

Fern, K. (2024). *Temperate Plants Database*. https://temperate.theferns.info/viewtropical.php?id=Symphytum+uplandicum

Frost, R., O'Meara, S., & MacPherson, H. (2014). The external use of comfrey: A practitioner survey. *Complementary Therapies in Clinical Practice*, *20*(4), 347–355.

Garden Organic. (2023). *How to make comfrey liquid fertiliser*.

Govere, S., Madziwa, B., & Mahlatini, P. (2011). The_Nutrient_Content_of_Organic_Liquid_F. *International Journal of Modern Engineering Research*, *1*(1), 196–202.

He, M., Zhang, K., Tan, H., Hu, R., Su, J., Wang, J., Huang, L., Zhang, Y., & Li, X. (2015). Nutrient levels within leaves, stems, and roots of the xeric species Reaumuria soongorica in relation to geographical, climatic, and soil conditions. *Ecology and Evolution*, *5*(7), 1494–1503. https://doi.org/10.1002/ece3.1441

Hills, L. D. (2011). *Comfrey: past, present and future*. Faber & Faber.

Javaria, S., Khan, M. Q., & Bakhsh, I. (2012). *Effect of potassium on chemical and sensory attributes of tomato fruit.*

Makus, D. J., & Lester, G. (2002). *Effect of soil type, light intensity, and cultivar on leaf nutrients in mustard greens*.

Oster, M., Reyer, H., Keiler, J., Ball, E., Mulvenna, C., Muráni, E., Ponsuksili, S., & Wimmers, K. (2020). Comfrey (Symphytum spp.) as an alternative field crop contributing to closed agricultural cycles in chicken feeding. *Science of the Total Environment*, *742*, 140490.

Staiger, C. (2013). Comfrey root: From tradition to modern clinical trials. *Wiener Medizinische Wochenschrift*, *163*(3–4), 58–64. https://doi.org/10.1007/s10354-012-0162-4

Trinklein, D. H. (2014). *Growing Home Tomatoes*.

Tyler, B., & Zarro, G. (2021). *A dynamic accumulator database and field trials for six promising species*.

Wilkinson, J. M. (2003). A laboratory evaluation of comfrey (Symphytum officinale L.) as a forage crop for ensilage. *Animal Feed Science and Technology*, *104*(1–4), 227–233.

Winsor, G. W. (1966). Some factors affecting the composition, flavour and firmness of tomatoes (Vol. 18).