MICROSCOPICAL EXPLORATION

FORTY THREE (ME43)

FERTILISERS IN FOCUS

Introduction

April 2025, and once again, it is that time of year when, here in the United Kingdom, we start to pay attention to whatever needs to be done in the garden after a winter of neglect. Before we sow our seeds and plant our plants, one of the things that we should and do consider is the fertility of our soil. Fertilisers come in many forms, but for the purposes of ME43 I will ignore those comprising raw animal excrement, horse manure and pig slurry etc., and concentrate on those less aromatic pellets and powders which are found in boxes on shelves at garden centres and at other purveyors of horticultural products.
I have chosen four fertilisers which, without giving brand names, are designated as follows:

i) Blood, Fish and Bone (BFB)
ii) Growmore (GM)
iii) Soluble Plant Food (SPF)
iv) Organic Potato Fertiliser (OPF)

While each of these fertilisers looks significantly different to the others, they all contain the same three plant macro-nutrients, Nitrogen, Phosphorus and Potassium, in various proportions as shown in the table below:

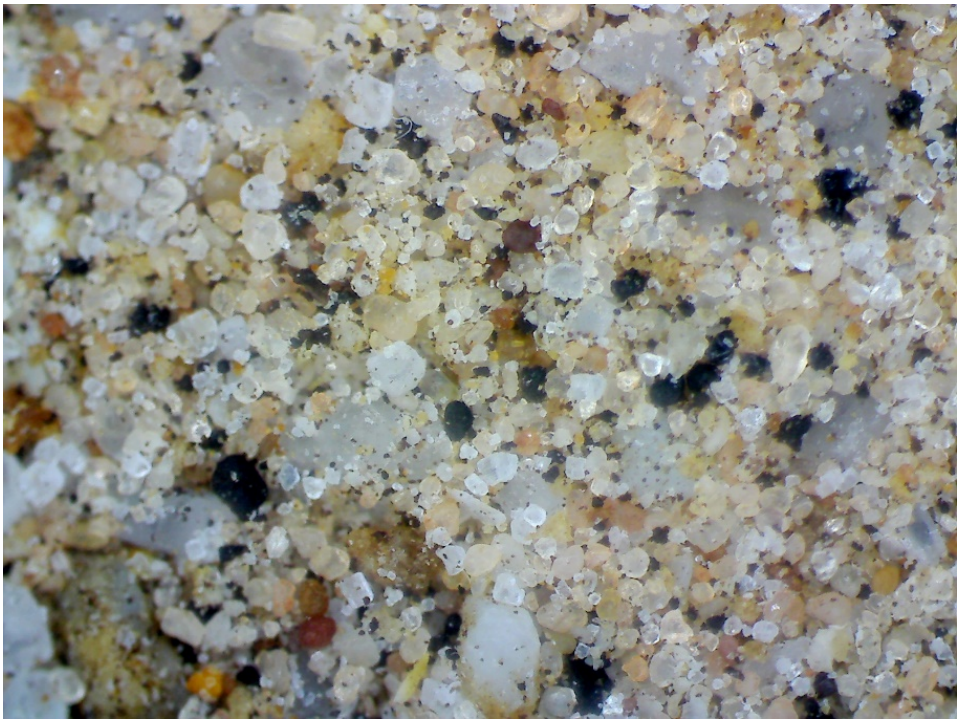
Fertiliser Name	Nitrogen %	Phosphorus % (water soluble)	Potassium %
Blood, Fish & Bone	5.0	5.0 (0.7)	6.0
Growmore	7.0	7.0 (6.0)	7.0
Soluble Plant Food	24.0	8.0 (8.0)	16.0
Organic Potato Fertiliser	4.0	2.5 (0.7)	8.0

Many fertilisers may contain other micro-nutrients not stipulated in the list of ingredients, and these might include Boron, Copper, Iron, Manganese, Molybdenum and Zinc.

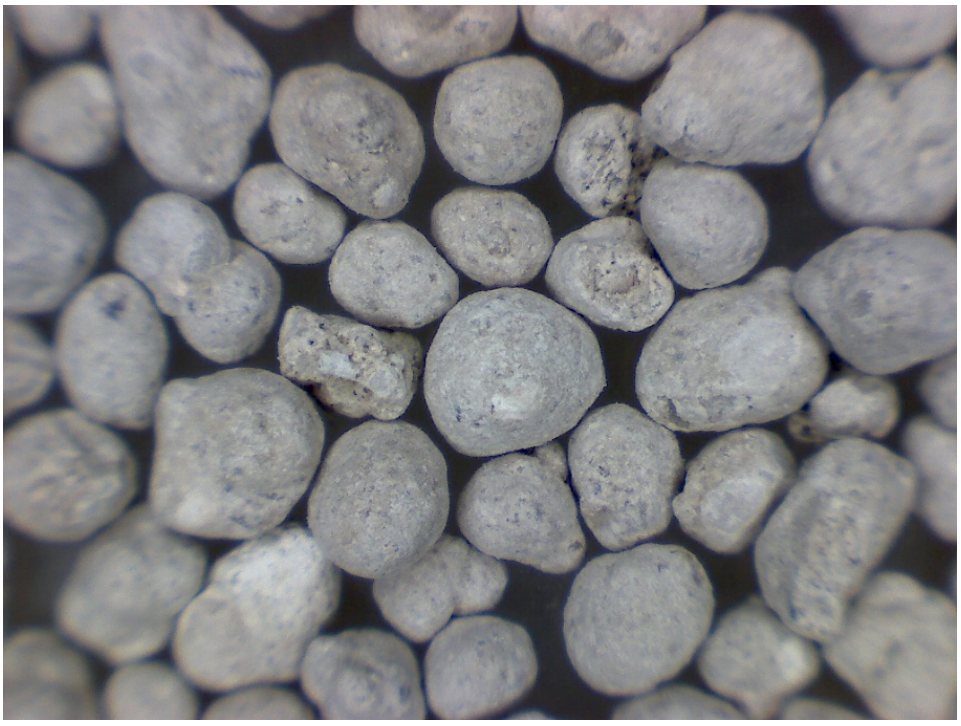
Part 1: The Macro

An image of each of the fertilisers, as it comes out of the box, is shown below:
The images were captured using the x1 objective pair on my Olympus VA-II stereomicroscope and my Brunel Eyecam Plus eyepiece camera at a resolution of 1600x1200 pixels.

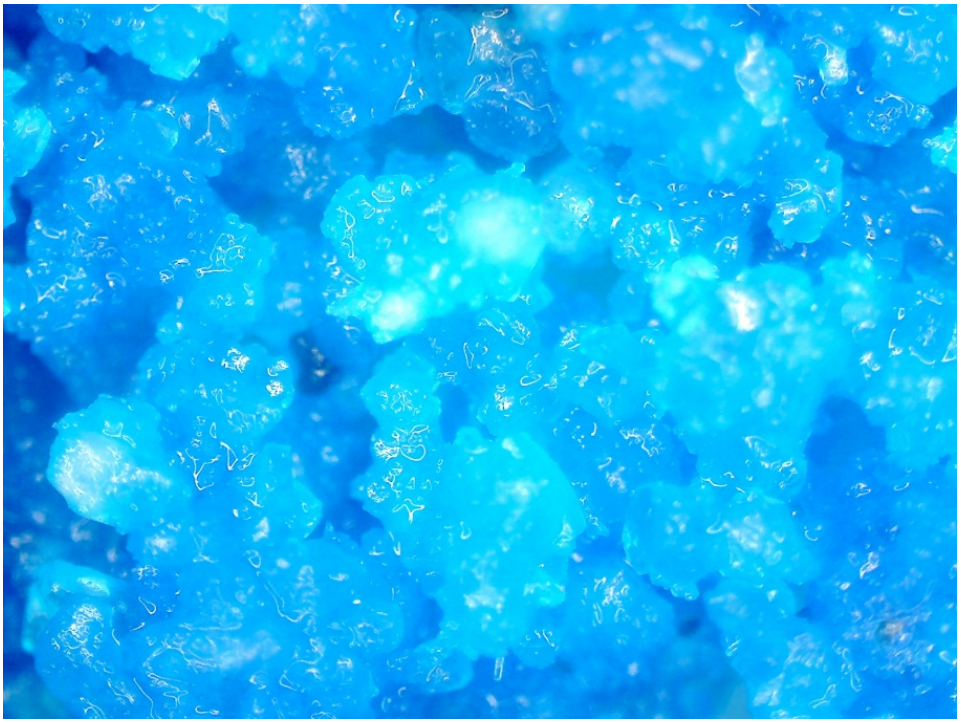
Blood Fish and Bone



Growmore



Soluble Plant Food



Organic Potato Fertiliser

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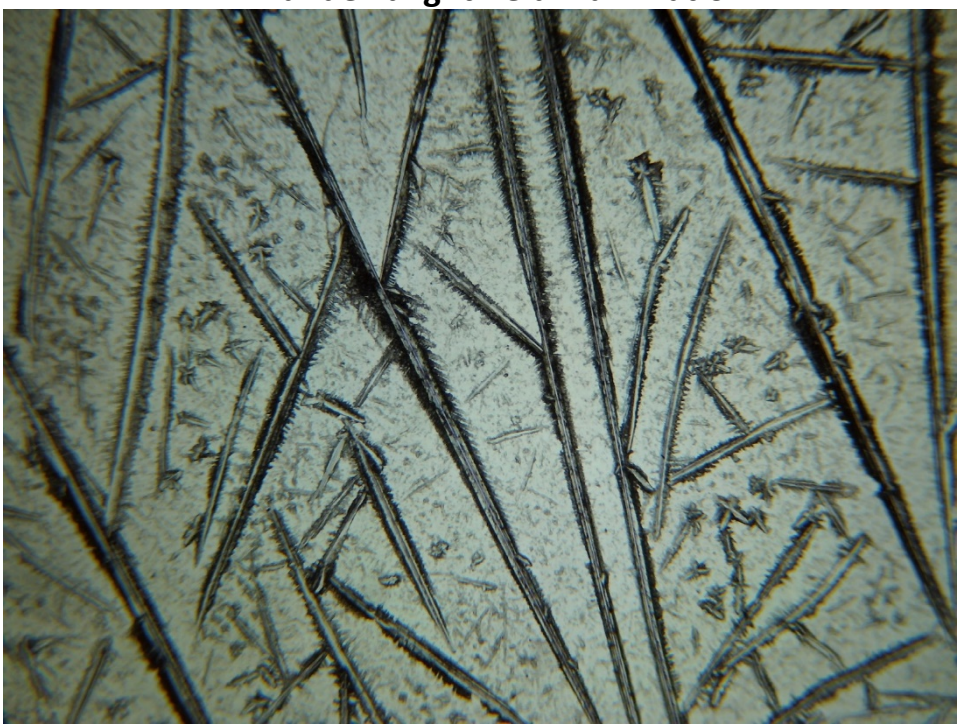
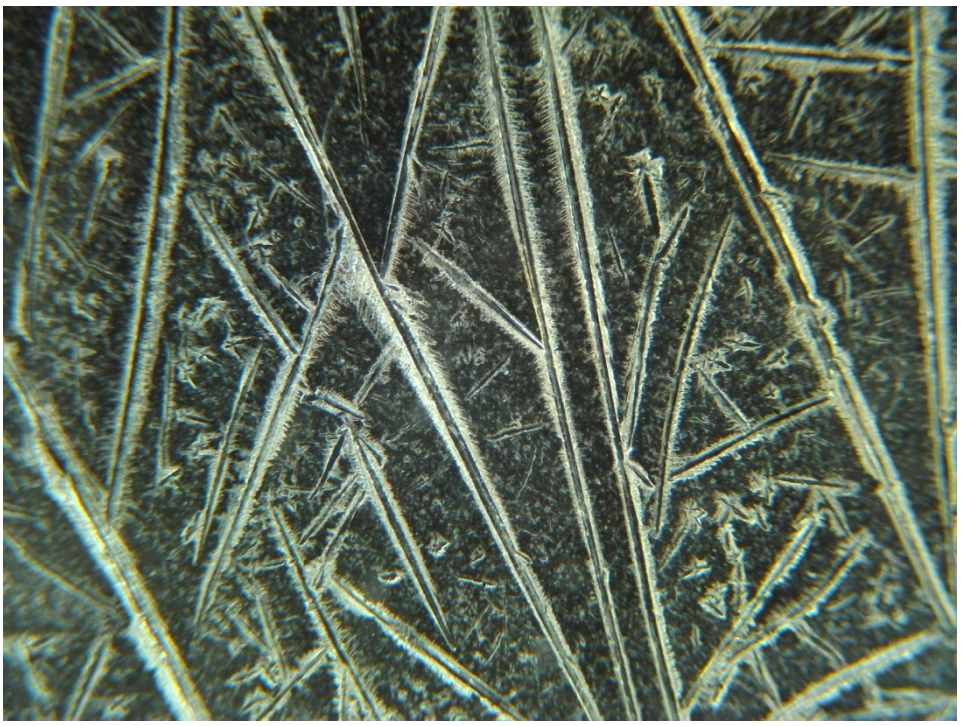
Part 2: The Micro

For this part of ME43 1.0 grams of each fertiliser was weighed into a separate labelled 28ml screw capped McCartney bottle. Twenty millilitres of cold water were then added to each bottle and the caps were screwed on tightly. The bottles were then shaken vigorously for one minute resulting in cloudy suspensions of the BFB, GM and OPF and a clear solution of the SPF. The cloudy suspensions were then clarified by filtration through filter paper, yielding clear solutions of the soluble components, and the separated solid residues of each fertiliser retained on the filter.
200µL of each of the clear solutions was pipetted onto a separate clean glass microscope slide, and allowed to evaporate to dryness on a hotplate at approximately 50°C.
The slides were observed with the x4 objective of my Swift SW380T microscope and the following images were captured at 1600x1200 pixels.

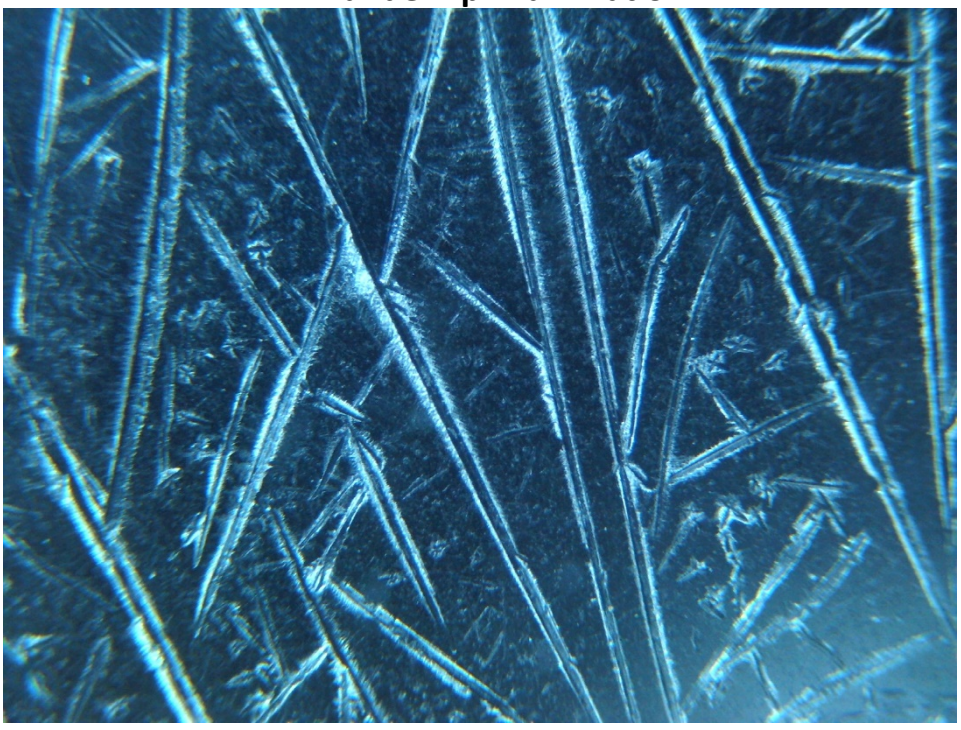
BFB under bright field illumination



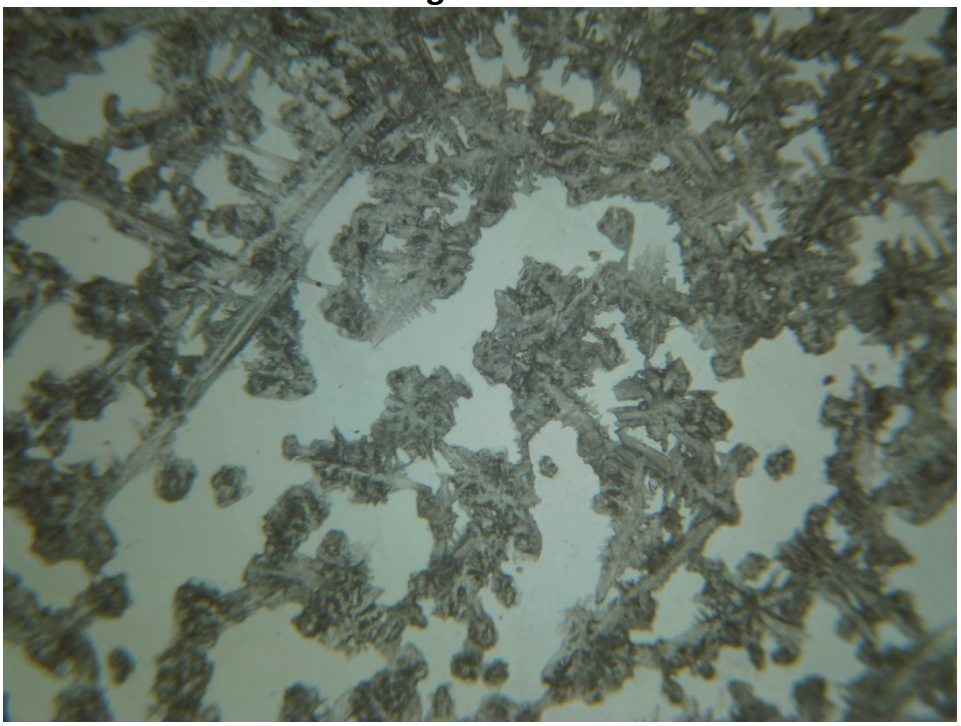
BFB under darkfield illumination



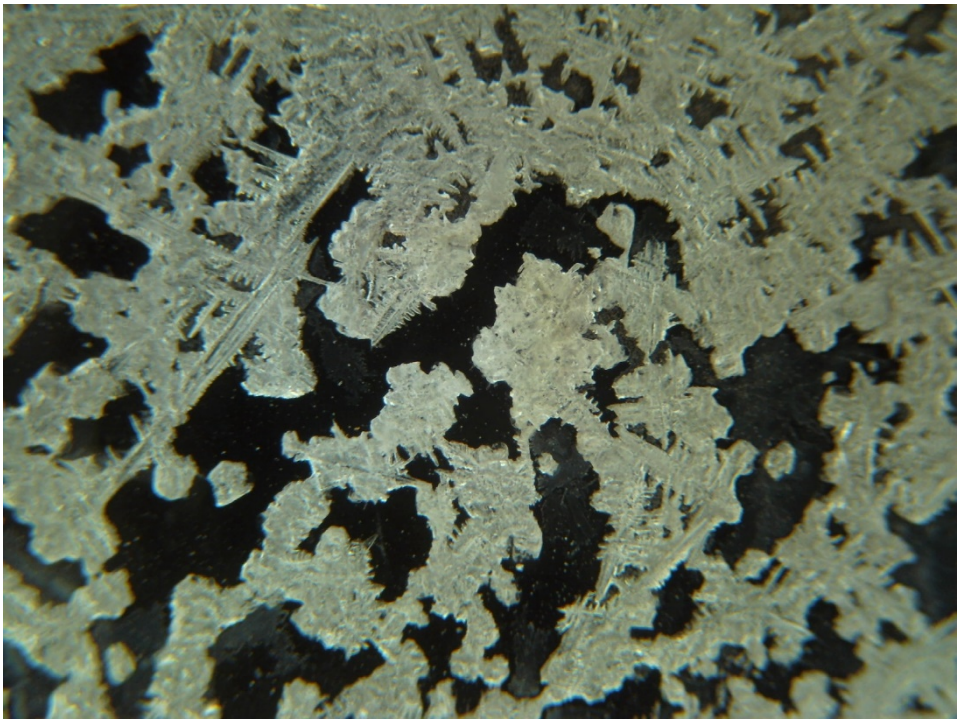
BFB under Epi illumination



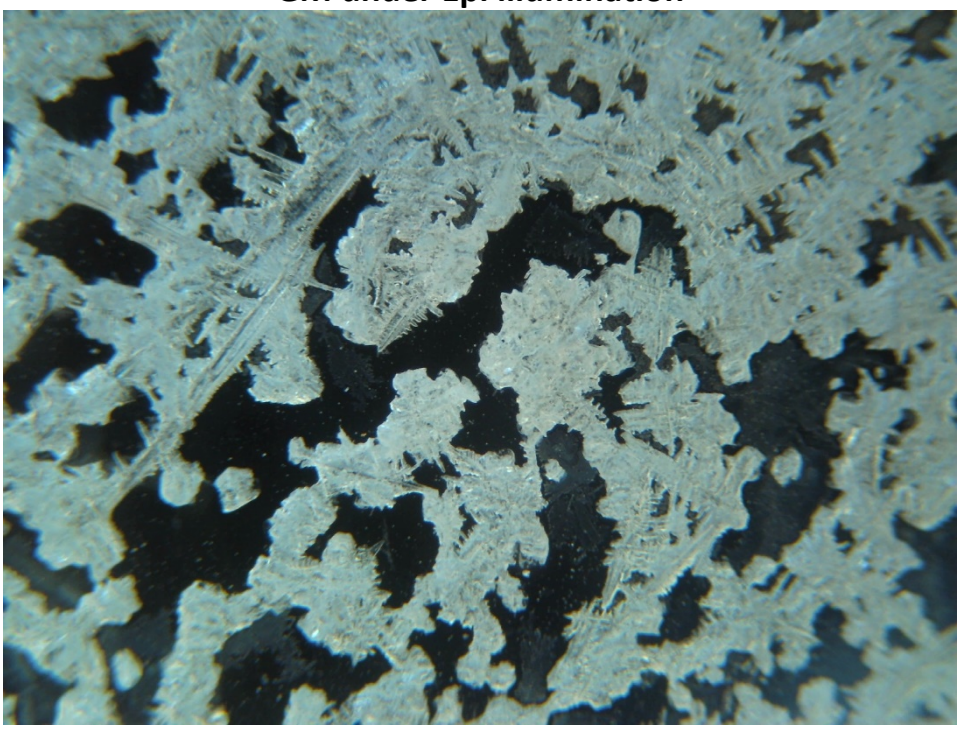
GM under brightfield illumination



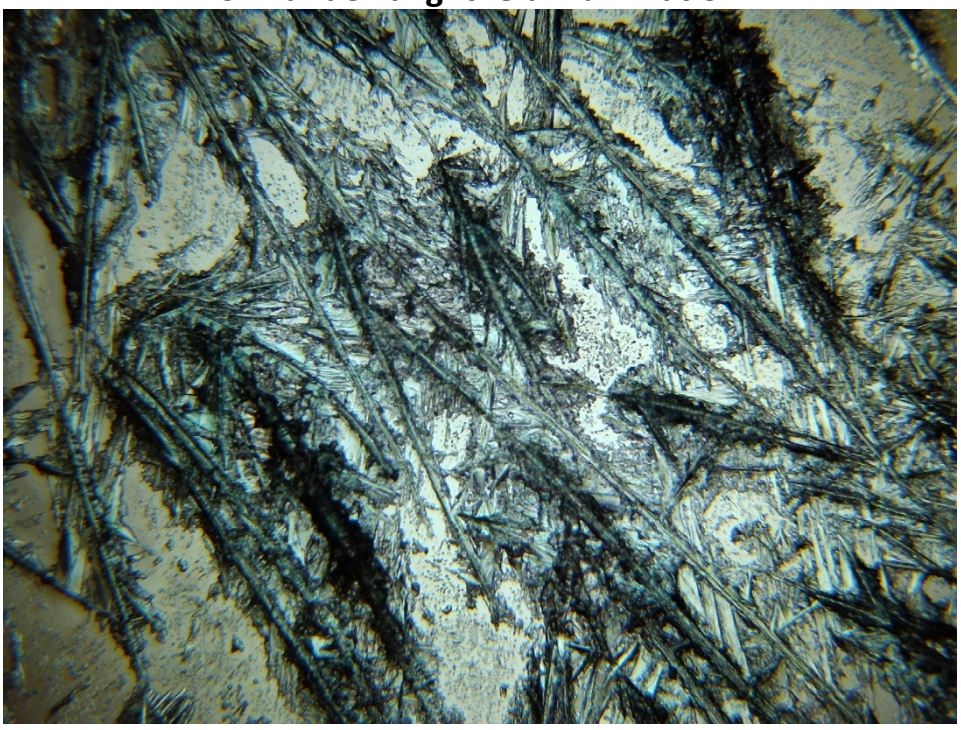
GM under darkfield illumination



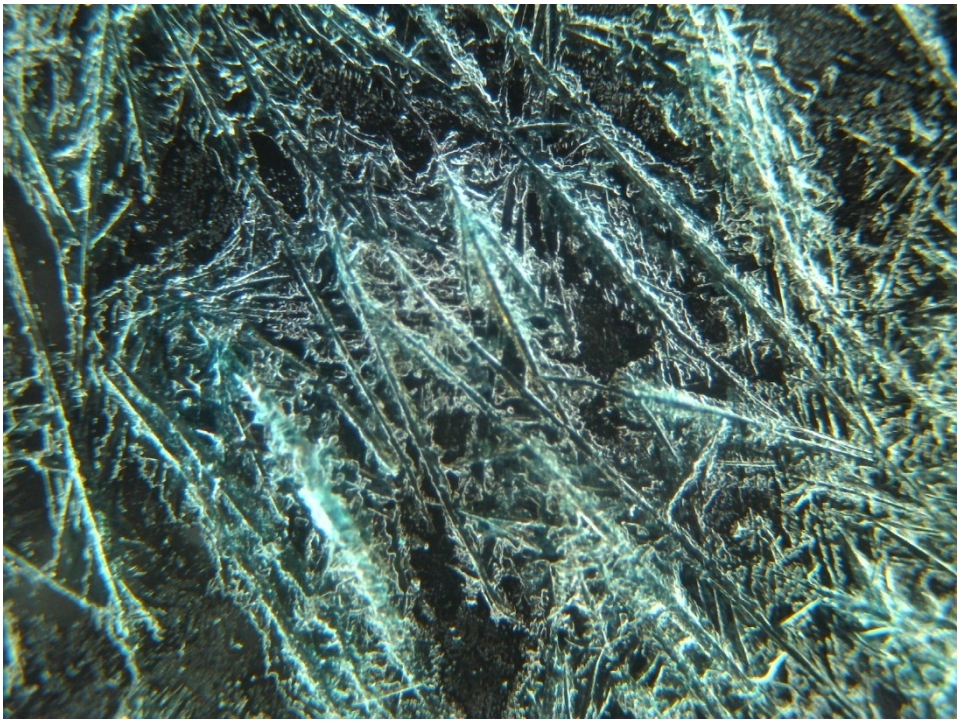
GM under Epi illumination



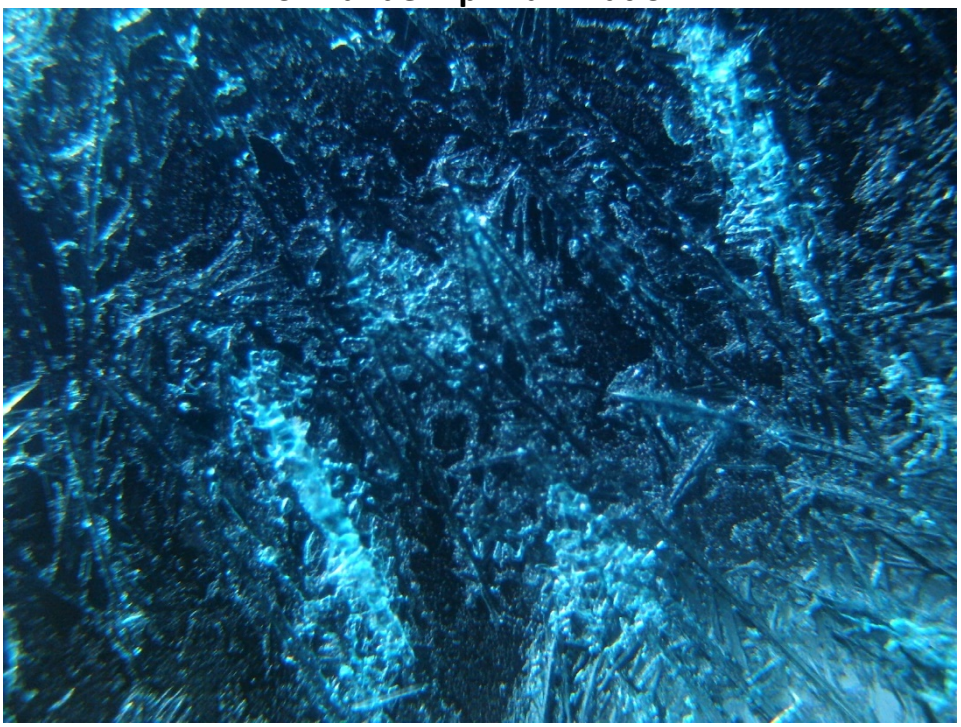
SPF under brightfield illumination



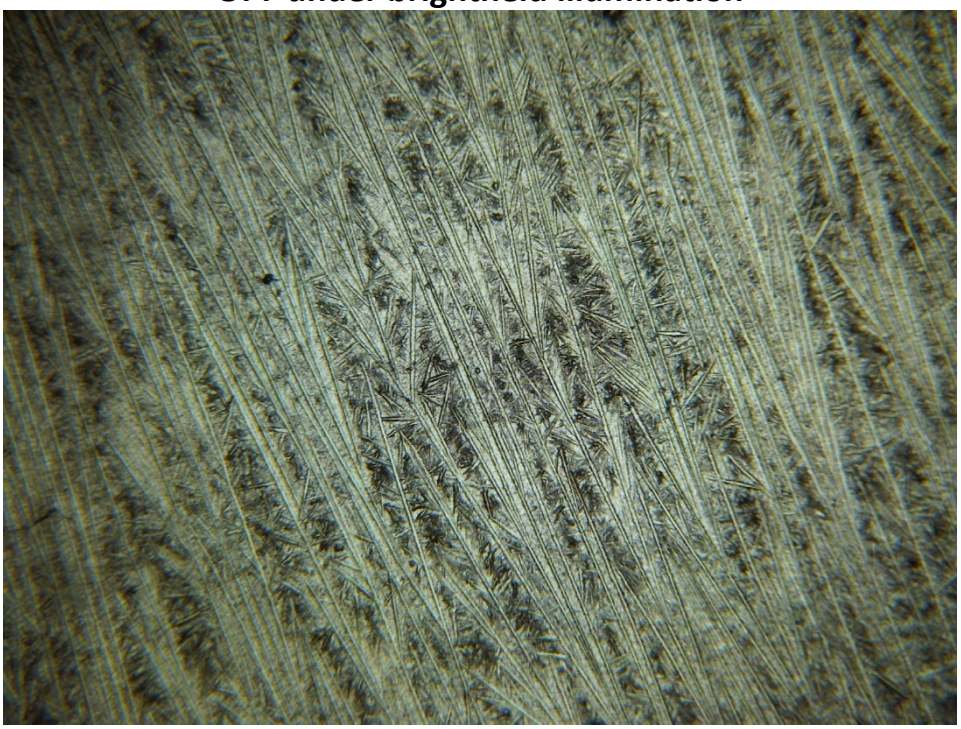
SPF under darkfield illumination



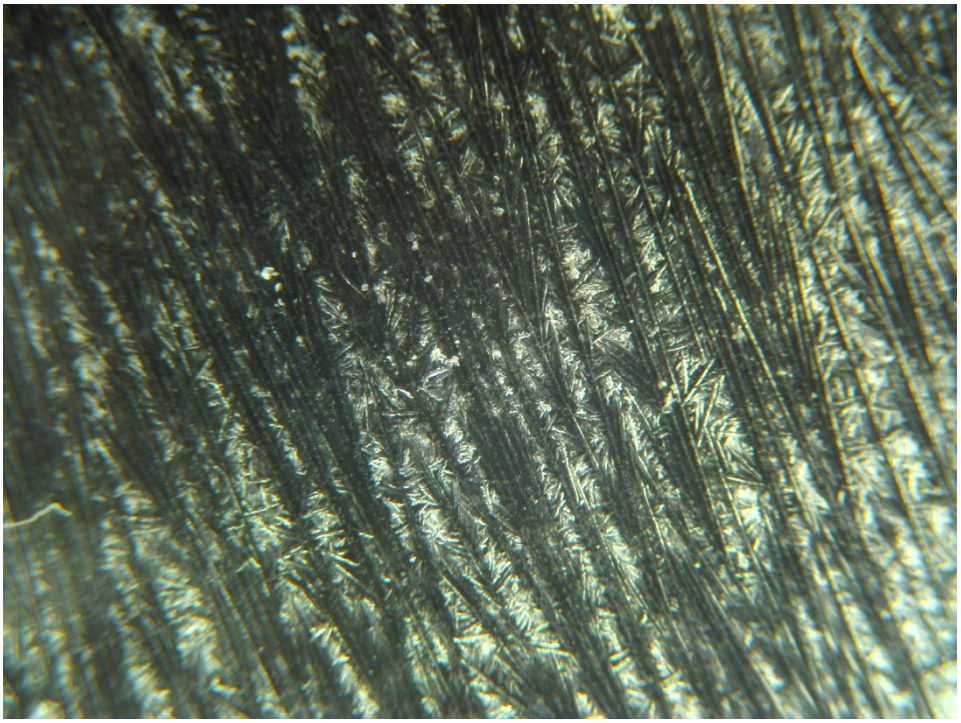
SPF under Epi illumination



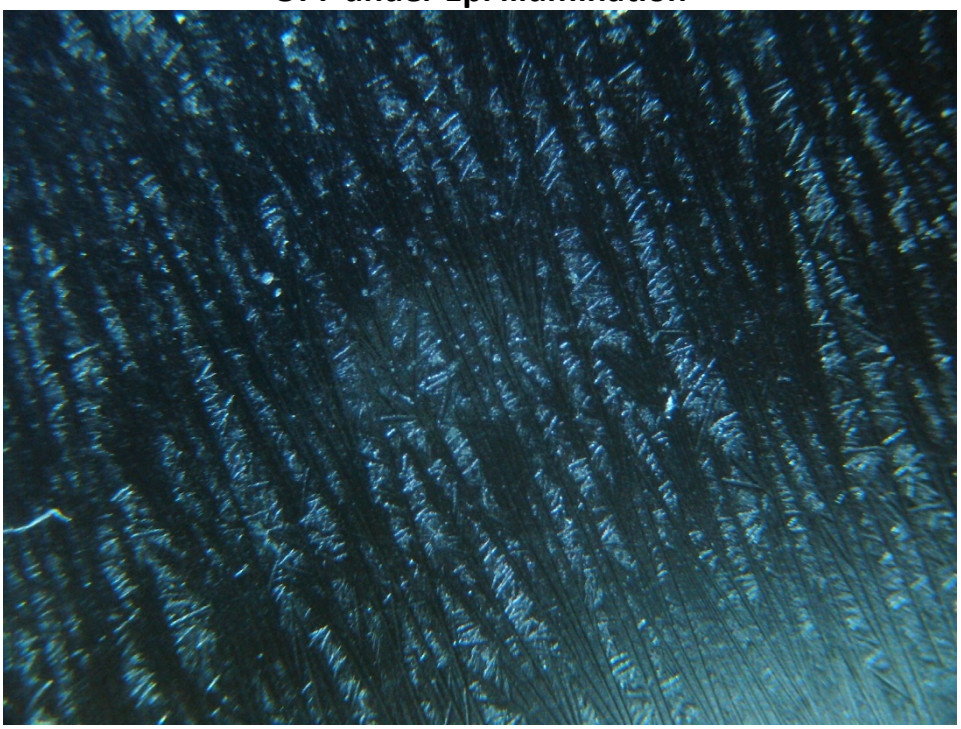
OPF under brightfield illumination



OPF under darkfield illumination



OPF under Epi illumination



Part 3: The Residue

In this, the final part of ME43, the dried solid residues which remained on the filter papers following the filtration of the initial water suspension of each fertiliser were observed.

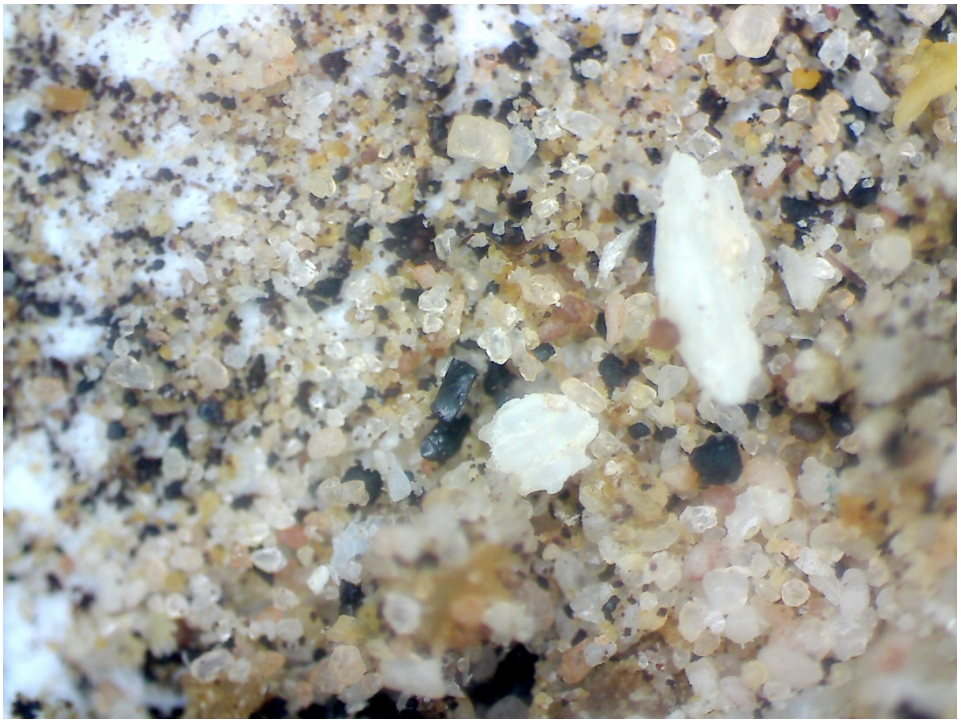
The BFB did not appear to be much altered by the treatment with water to dissolve the soluble nutrients and the residue, on close observation, had the appearance of silica sand, and was weighed at 0.39grams.

The GM pellets were observed to have broken down during the treatment with water and the dried residue had the appearance of crushed chalk and weighed in at 0.35grams.

The OPF granules were also observed to have disintegrated during suspension in water and the dried residue had a somewhat fibrous appearance and weighed 0.49grams.

Once more the Olympus VA-II, with its x1 objective pair was the instrument of choice for these observations and the following images were captured.

BFB Residue



GM Residue

OPF Residue

In conclusion

All of the fertilisers chosen for ME43 contained at least 50% soluble plant nutritious ingredients, with the SPF being 100% soluble as its name suggests. The insoluble residues of the three that had them are, presumably, included as soil improvers in some other capacity.

As we say here in Cumbria:
‘Ave a go yersel’!

Comments, gratefully received, to:

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