fibrophos

PK & trace element fertiliser

The benefits of Fibrophos

Boost Sulphur + Increase Trace Elements

Contents

1 What is Fibrophos?

What is Fibrophos?

Fibrophos is a PK fertiliser of totally organic origin consisting mainly of phosphate and potash, with valuable secondary elements of sulphur, magnesium, calcium and sodium, together with significant quantities of essential trace elements required for healthy crops and grass. It is a unique compound and is not a blend.

Where does Fibrophos come from?

Fibrophos is derived from the incineration of predominantly deep litter poultry manure at temperatures in excess of 850°C which is used as a fuel to create green electricity supplied to the national grid.

What does Fibrophos contain?

The resulting ash contains all the plant nutrients in similar proportions to those found in cereal crops.

When applied to land as a fertiliser; Fibrophos is effectively recycling these valuable nutrients back into viable crops – thus reducing the use of scarce mined mineral resources from abroad.

Delivering a positive carbon benefit

Studies by independent consulting company SLR have calculated based on feedstock types, cost of energy production and the value of green electricity produced relative to other generation methods that Fibrophos shows a significant positive carbon benefit. This is both in terms of the energy produced and the savings when used as a fertiliser.

Fibrophos delivers an average saving of 0.53 tonnes of CO_2 per tonne of fertiliser.

The green electricity exported to the national grid as a result of burning the natural fuels delivers an average saving of 0.31 tonnes of CO_2 per MWh.

The figures are even more striking when one considers the negative environmental impacts of mining nutrients for alternative inorganic fertilisers in far off countries and the subsequent import into the UK with the associated logistics and dockside handling.

How do we know Fibrophos does what is claimed?

Over many years, formal trial work has been systematically carried out to establish that the product performs in yield and quality terms as well as Triple-Superphosphate (TSP) and Muriate of Potash (MOP) - both of which are used as standards. Using a variety of well respected research bodies, it has been confirmed that the phosphate and potash in Fibrophos are as effective as TSP and MOP across most soil pH levels. In some cases the potash in Fibrophos was shown to demonstrate less antagonism than that of MOP.

The trials also demonstrated that performance was increased by the presence of the other major and minor nutrients naturally occurring in Fibrophos.

How does Fibrophos compare with other fertilisers?

Fibrophos has always been priced competitively on a unit delivered basis of its PK content alone. The many added benefits of the secondary and trace elements are therefore offered as a considerable bonus.

Organic status of Fibrophos?

Although derived from totally organic origin, Fibrophos has not been given organic registration where the litter is derived from poultry reared in intensive systems which include most broiler units. Where litter has been sourced from approved animal husbandry systems, Fibrophos is approved for use on organic systems by Organic Farmers & Growers. Therefore, unless specifically requested Fibrophos cannot be used in organic systems.

Availability and application of Fibrophos

Fibrophos is available as a coarse powder and is best spread using contractors' moving belt machines. There is a comprehensive network of distributors and merchants throughout the UK who will have access to suitable machines.

Summaries of all the trials are available from our website ***www.fibrophos.co.uk***

2 What's in Fibrophos?

Balanced grades

0-12-12 England and Wales
0-14-14 Scotland

Ideal for arable and grassland where balanced PKs are required

Potash grades

0-5-20 **0-12-18** **0-9-18**

Perfect for lower potash soils, silage and potash demanding crops where that extra potash is required

Other nutrients typically present in all grades:		
Secondary Elements		
Calcium	18%	as CaO
Sulphur	8%	as SO_3
Magnesium	4%	as MgO
Sodium	4%	as Na_2O
Trace elements		
Iron	4000ppm	as Fe
Manganese	1200ppm	as Mn
Copper	300ppm	as Cu
Boron	130ppm	as B
Molybdenum	5ppm	as Mo
Cobalt	2ppm	as Co
Selenium	2ppm	as Se
Neutralising value	15%	as CaO
Phosphate in all grades is >80% soluble in 2% citric acid Potash in all grades is > 50% soluble in water.		
All Fibrophos is sold under the Fertiliser Regulations 1991 No. 2197 (page 46) and sales are supported with a statutory statement. Fibrophos Ltd are members of the AIC.		

3 Phosphate in Fibrophos

Trials have shown that Fibrophos is a very effective source of phosphate across a wide range of soil types throughout the UK. The phosphate in Fibrophos is more than 80% soluble in 2% citric acid and half is soluble in neutral ammonium citrate providing a long lasting as well as immediate supply to the growing crop.

Applications to both acid and alkaline soils have been shown to increase the available soil phosphate within one month and this increase was maintained for at least 12 months.

Evaluation of Fibrophos as a fertiliser

OBJECTIVE AND METHOD	
ADAS Huntingdon	*S.J.Richardson*

Ryegrass was chosen as the test crop because sequential cuts allow an assessment of how quickly nutrients become available as well as revealing their overall availability. Two soils were used with very low P content. The pH's were 8.2 and 6.4 respectively. Cuts were taken whenever the most advanced plants reached 10-12cm in height on each occasion.

Ashed Poultry Litter (Fibrophos) was compared with TSP, Basic Slag and Rock Phosphate.

Observations: Three months after sowing, yield was restricted in the nil treatment whereas all fertiliser treatments except phosphate rock markedly increased yield. At that stage, both yield and phosphorus content of the foliage already indicated that the phosphorus in the Fibrophos was at least as readily available, possibly more so, than that in basic slag and more readily available than that in phosphate rock.

By cut 6 both yield and phosphorus uptake data for Fibrophos showed it to be superior to basic slag and rock phosphate. Of more significance however is the evidence that Fibrophos is as effective as TSP.

The design of the trial included TSP added in steps of 40Kg/ha P_2O_5 in order to allow the efficiency of Fibrophos to be assessed: both yield and phosphorus uptake suggest it is 100% efficient within 2 months of application.

Conclusion

As a long lasting source therefore, Fibrophos is ideal for raising the soil phosphate status and maintaining it. Used for this purpose when soil phosphate is 0 or 1, Fibrophos can be applied at 1000Kg/ha every 1-2 years depending on crop potential. This will provide an adequate level of phosphate to ensure full effectiveness of nitrogen.

Unravelling the myths

The history of Phosphate

Dissolved bones formed the first 'manufactured' phosphate fertilisers and this was shortly followed by slag from blast furnaces.

Phosphate is vital for root development and the seed ripening process. It is taken up by the plant as either dihydrogen phosphate (H_2PO_4) or hydrogen phosphate (HPO_4^{2-}).

Phosphorus as a fertiliser is always expressed as phosphate P_2O_5 in the UK.

Phosphate in the soil

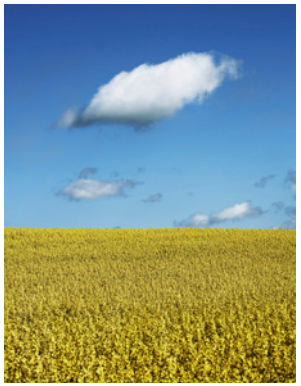
Phosphate exists in the soil as two basic forms:

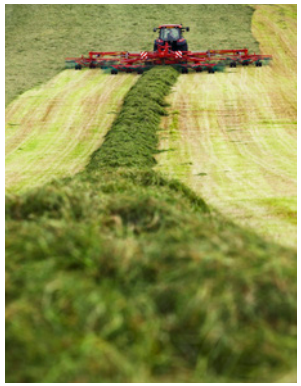
Organic Phosphate

30-50% of total phosphate in UK soils is in this form as a series of complex substances. It can be released by micro-organisms to form hydrogen phosphates, the timing of which does not always coincide with when the plant needs it.

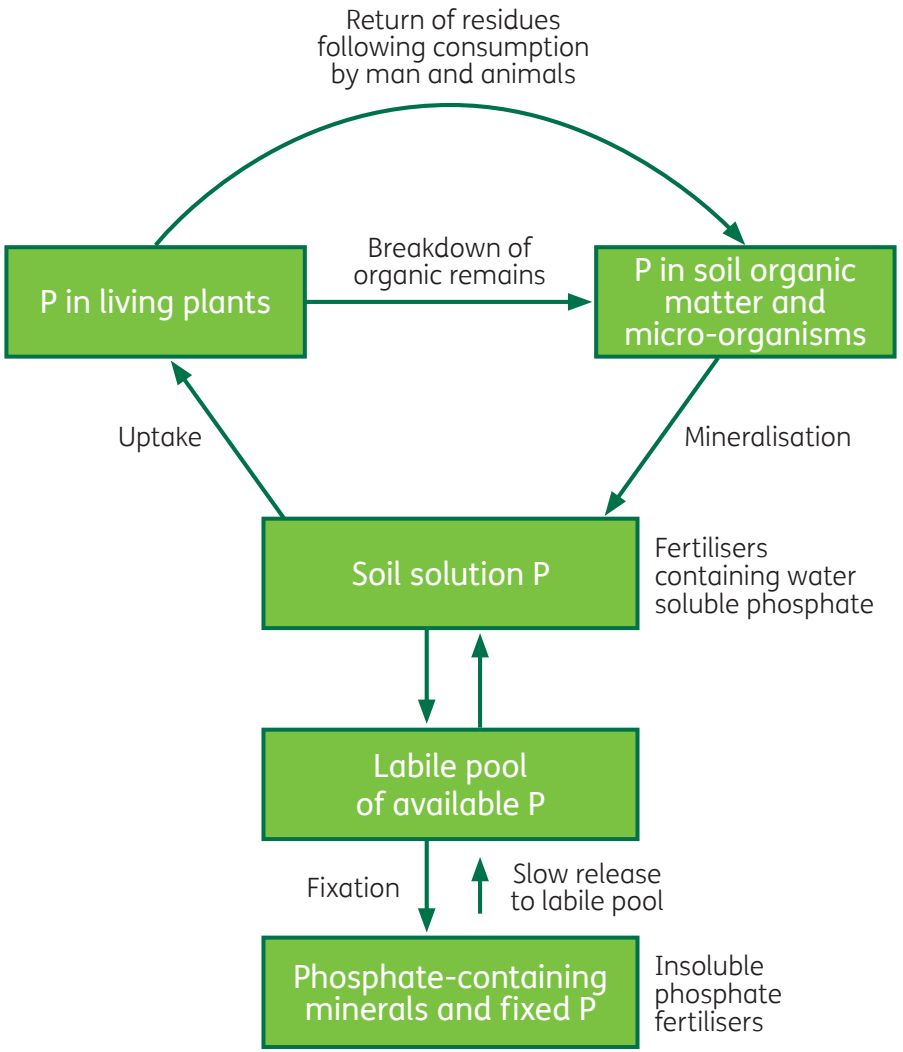
Inorganic Phosphate

The balance of phosphates are held as either calcium phosphates with varying degrees of availability, often on calcareous soils with high pH or as iron or aluminium phosphates – particularly on acid clay soils.

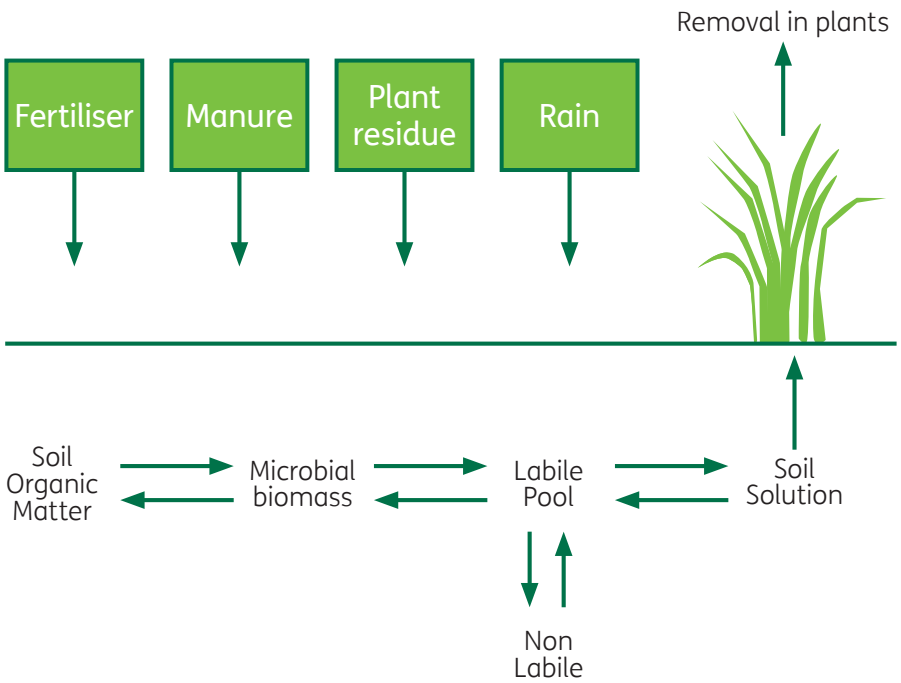




The phosphorus cycle



The phosphate cycle



The plant is only able to take up phosphate from the soil in solution. The amount of phosphate in solution at any one time is small due to its tendency to form complex organic and inorganic forms. There are therefore three 'pools' of phosphate in the soil:

1) Soluble phosphate.
2) Phosphate present in the labile pool and adsorbed onto clay minerals.
3) Phosphate not readily available.

All three pools exist in equilibrium. Inputs to the system tend to come from fertiliser, rain, manures and plant residues. These inputs distribute the equilibrium temporarily.

Movement of phosphate to plant roots via diffusion is some 100 times slower than that of potash. In ideal conditions, roots 'explore' more of the soil giving them access to larger amounts of phosphate. The ability of the plant to perform can be restricted when conditions are less favourable such as poor soil structure, excess water or low soil temperatures or when the plant is small, soon after germination. Low temperatures compound the problem as the ability of phosphate to diffuse through the soil is also reduced and plant growth can be slowed.

In addition, in high alkali or acid grassland soils, access to phosphate is further restricted by formation of organic or inorganic compounds. Typically, the phosphate in grazed grassland accumulates in the top 5cm with little downward movement to the roots where it is needed. For these reasons it is essential to ensure that the soil's reserves are kept well 'topped up' and in reseeds and arable situations, replacement phosphate applications are well incorporated in the soil.

Phosphate Availability in Fibrophos

For convenience, availability of phosphate in fertilisers is typically indicated by the solubility not just in water but in other solutions prepared in laboratories to simulate soil conditions around the root hairs. Neutral ammonium citrate and 2% citric acid are common examples.

It has been commonly thought that water soluble phosphate is the most efficient and cost effective way to apply phosphate to growing crops. This information has been widely preached by the major fertiliser manufacturers who have been keen to promote their water soluble products.

While it is certainly true that water soluble phosphate is readily available to the plant when it is first applied and is vital when indices are very low, the truth is the phosphate very rapidly forms compounds which render the phosphate less available within a very short space of time. This process begins as soon as phosphate is applied. Some will revert from the soluble form to the labile pool and some to the non-labile pool. Note that some of the phosphate in the non-labile pool can remain locked there for many, many years.

Unless soil phosphate levels are found to be below index 1 (England and Wales), there seems to be little justification in paying a premium for water soluble phosphate when cheaper forms of phosphate such as Fibrophos are equally beneficial to the plant.

'It is inefficient to apply large applications of water-soluble phosphate at one time. If this is done, the phosphate that is not taken up by the crop will move into the labile and then non-labile forms so losing its availability.'

Dr Ian Richards, *Soil Agronomist*

It has been estimated by the Macaulay Land Use Research Institute that in broad terms, while only 5% of applied water soluble phosphate will be available in the first year of application, only 1-2% will be available in subsequent years. Work at ADAS Bridgets has suggested that the higher the level of P in the soil, the greater the rate of fixation to an unavailable form.

These immobile reserves can become mobile by the activity of microbes in the soil and these microbes are motivated by good balanced healthy soil encouraged by the correct nutrient balance of trace elements and well structured and aerated soils. The comparative success of calcified seaweeds and the impressive results from Fibrophos trials support this theory.

Phosphate

Key points

- **Does not get locked up as rapidly as water soluble phosphate**
- **Available across a wide range of soil types**
- **Available to all crops**
- **Immediate performance but also sustained performance**
- **Flexible product - simple & convenient to use across the farm**
- **A cost effective way of maintaining soil P indices**
- **The longer term benefits of phosphate in Fibrophos are particularly good for improving poorer quality land over time**
- **Ideal for rotational manuring (particularly applicable for rotations including cereals, peas, beans, and oilseed rape)**

4 Potash in Fibrophos

Trials have shown that Fibrophos is a very effective source of potash across a wide range of soil types throughout the UK. Potash is an important nutrient for grass especially where the whole crop is removed by silage or hay cuts.

In grain, potash is removed in proportion to the yield, e.g. 10.4kg per hectare are removed in each tonne of grain and straw. 18kg per hectare of potash are removed in each tonne of hay.

Fibrophos not only replaces the potash removed but also replenishes the soil with important secondary elements and most of the trace elements.

Evaluation of Fibrophos as a fertiliser

OBJECTIVE AND METHOD	
ADAS Huntingdon	*S.J.Richardson*
Ryegrass was chosen as the test crop because sequential cuts allow an assessment of how quickly nutrients become available as well as revealing their overall availability. Two soils were used with low K levels. The pH's were 8.2 and 6.4 respectively. Cuts were taken whenever the most advanced plants reached 10-12cm in height on each occasion. Ashed Poultry Litter (Fibrophos) was compared with Muriate of Potash. Response to potassium was both rapid and significant from Cut 1 onwards. At Cut 4, both yield and leaf potassium content showed the potassium in Fibrophos to be very largely available.	

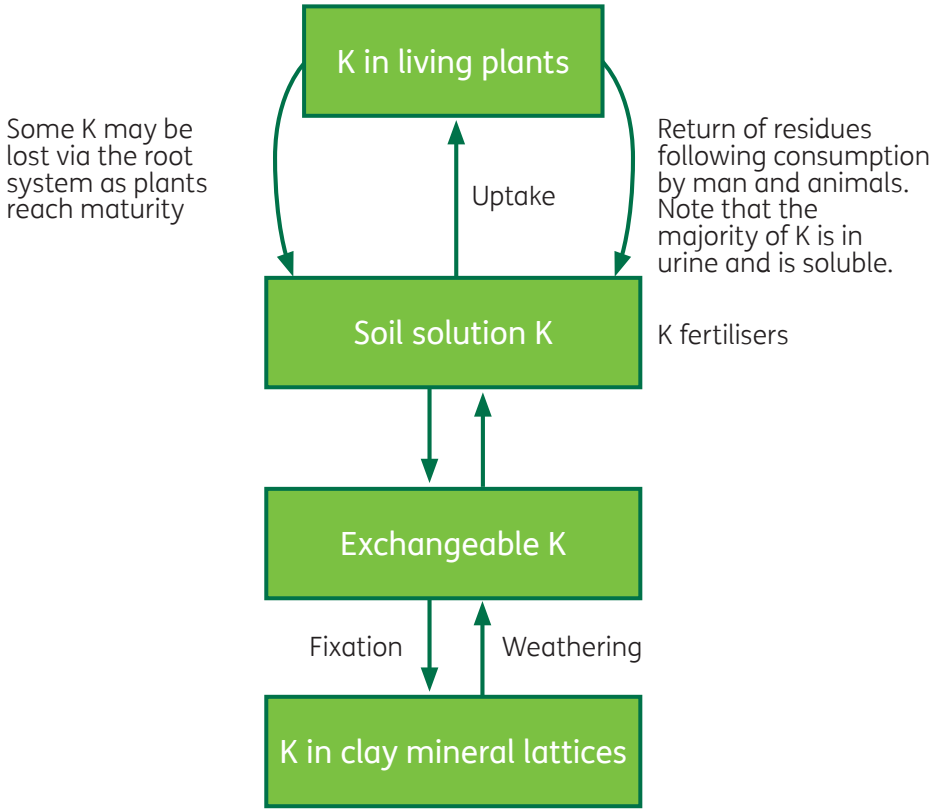
Conclusion

On balance, the evidence from total yield and potassium uptake indicates that the potassium in Fibrophos is 90-100% available within a few months of application.

Since these early trials conducted in 1994 over 2 million tonnes of Fibrophos have been sold nationwide for both cereal and grassland applications.

Many of the sales made today are to farmers who have used Fibrophos across their farms for the past 30 years - thus endorsing the work carried out by ADAS.

The potassium cycle



"It is likely that any residual potassium unused in the first season will remain or become available to plants in the longer term. Thus Fibrophos is a very effective fertiliser for grass and it can be assumed with confidence that it would be equally valuable for cereals, oilseed rape, peas, beans, linseed and many other crops.

It would be appropriate to apply the product either annually or in larger dressings every three years for nutrient maintenance purposes."

Selwyn Richardson, *ADAS*

Potash

Key points

- **Cost effective way of improving and maintaining K indices**
- **Reduced risk of leaching on light soils**
- **Immediately available**
- **Potash availability in line with crop growth demands**
  - Stronger healthier plants

General background notes on potash:

- Potash index should be 2 (England and Wales) for adequate growth.
- If indices are under 2 then larger amounts of potash should be applied to replace and improve index over a period of years.
- Grass yield increases of 65% have been shown on soil K index 0. (28% on soil index 1)
- Light land requires more potash than heavy land. Low potash reduces grain yield, quality and vigour
- Potash in potatoes is the most important nutrient affecting quality, tuber size, dry matter, storage and drought and disease resistance.

Staggers

The level of potassium in the rumen is a factor known to inhibit magnesium absorption in the rumen. Lactating cows secrete magnesium in the milk so can be particularly prone to Staggers.

Fibrophos contains a less soluble form of potash than some other fertilisers, and also contains good levels of magnesium to help compensate so cattle are at less risk with Fibrophos than other fertilisers. However, it is recommended that stock are not grazed on land fertilised with Fibrophos for up to 21 days or unless a good rain has washed the product off the foliage.

5 Secondary Elements in Fibrophos

Fibrophos fertilisers contain a wide range of secondary nutrients and important trace elements in significant quantities.

Furthermore, chemical analysis has shown that those released are in forms available to plants.

Sulphur up to 8% as SO_3

Sulphur is essential for crop growth and the amount needed is roughly half that of phosphate.

Fibrophos contains good levels of sulphur - typically 8% SO_3. With sulphur deficiencies now widespread, Fibrophos is able to significantly reduce the risk of deficiency - improving both yield and quality in many cases. Regular applications of Fibrophos will supply most of the sulphur required for most situations. Oilseed rape and brassica crops respond particularly well to high levels of sulphur in Fibrophos.

Fibrophos as a source of Sulphur

OBJECTIVE AND METHOD	
Levington Agriculture Ltd	*Ian Richards*
Fibrophos was assessed as a source of sulphur in comparison to ammonium sulphate, calcium sulphate, and Tiger 90 (sulphur/bentonite). Leaching was assessed in a bare soil over winter and was subsequently planted with ryegrass to measure uptake of residual sulphur. Two replicated trials on two light textured soils of relatively low sulphur status were used. Soils were brought to field capacity and leached by fortnightly applications of demineralised water over winter. In both trials the available sulphur was leached from ammonium sulphate, calcium sulphate and Fibrophos. Tiger 90 was not leached nor picked up in the soil analysis.	

Conclusion

"The sulphur in Fibrophos is as readily available as that in Ammonium Sulphate or Calcium Sulphate"

Ian Richards, *Soil Agronomist*

Sulphur up to 8% as SO_3

Key points

- **Helps correct soil sulphur deficiencies**
- **Higher yields**
- **Improves resistance to disease and pests**
- **Better quality proteins**
- **Improves nitrogen assimilation**

General background notes on sulphur:

- SO_2 emissions in the UK have been significantly reduced since the late 80's.
- Much of British farmland is at high risk of sulphur deficiency.
- Sulphur is highly leachable and generally does not remain in soil over winter.
- Sulphur deficiencies are commonly noticed too late to take action.

Conversion: [Convert S to SO_3 x 2.5]

Magnesium up to 4% as MgO

Magnesium improves the feed value of grass and inadequate supplies can lead to grass tetany. Regular applications of Fibrophos (typically 4% MgO) maintain good levels of magnesium in the soil thus reducing the risk of staggers.

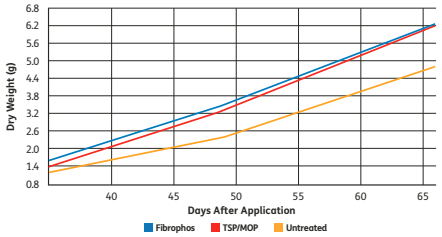
In arable situations, magnesium deficiencies are a problem for potatoes and sugar beet. Other crops can show symptoms but often too late to rectify. Regular applications of Fibrophos will maintain adequate reserves in the soil thus reducing the risk of yield loss.

Magnesium uptake

OBJECTIVE AND METHOD	
Levington Agriculture Ltd	*Ian Richards*
Two rates of Fibrophos were applied to compare the effectiveness of the magnesium and sodium from Fibrophos against Inorganic fertiliser applied as TSP and MOP and an untreated control. Pots were sown under heated glass with lighting. TSP and MOP added at equal rates to the Fibrophos and each was cut three times.	

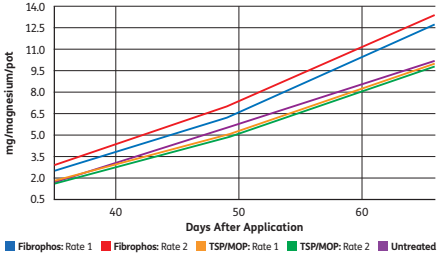
Dry Matter

Grass dry matter increased above the untreated controls for all fertiliser treatments. These were in line with nutrient levels applied indicating a response in all cases.



Cumulative uptake of Magnesium

There is a sustained magnesium response to Fibrophos showing how Fibrophos continues to release nutrients long into the growing season.



Magnesium deficiency in the first cut where TSP/MOP was applied was significant. The overall uptake of magnesium by the grass in this deficient soil was greatest where Fibrophos was applied, with TSP/MOP resulting in a significantly lower uptake.

"The effects demonstrated are important for grazing animals where magnesium is an important constituent of their diets. Fibrophos did not show the antagonism found with MOP against magnesium"

Key points

- **Helps correct soil magnesium deficiencies**
- **Higher yields**
- **Improves feed value of grass**
- **Reduced risk of staggers**
- **Less disease (reduces plant stress)**
- **Better quality (helps keep plants green)**

General background notes on magnesium:

- Magnesium recommendations are generally based on available Mg levels (soil analysis) and are expressed as Kg/MgO/Ha
- Magnesium levels in grass are influenced by application of nitrogen and potash
- Inadequate supplies of magnesium in grass can lead to grass tetany
- Feeding standards recommend not less than 0.18% Mg in dietary dry matter for milking cows

Conversion: [Convert Mg to MgO x 1.66]

Sodium up to 4% as Na_2O

Sodium dramatically improves palatability of grass and helps to maintain healthy pastures. Cattle and sheep have been seen to favour pastures where Fibrophos is applied and the feed content of the grass is enhanced.

Sodium uptake

OBJECTIVE AND METHOD	
Levington Agriculture Ltd	*Ian Richards*
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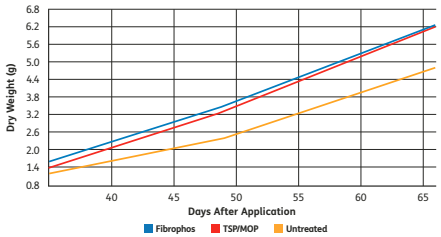
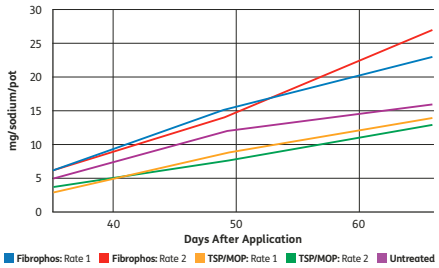


Cumulative uptake of Sodium

The application of Fibrophos provides a dramatic increase in the uptake of sodium. The TSP/MOP depresses sodium uptake below that of the unfertilised control.



Cumulative Dry Weight

Fibrophos can be seen to yield as well as equivalent applications of TSP and MOP and to become available to the crop at an early stage of growth.

Fibrophos increased the uptake of sodium particularly at the second cut for the lower application rate and for both rates in the third cut.

The sodium uptake in the grass was decreased by addition of TSP/ MOP. This was more pronounced at the higher rates of application.

Fibrophos maintained sodium levels in grass well above the levels of 0.15% Na at which dietary deficiency in grazing animals is a concern. The total uptake in the grass of sodium was significantly greater when Fibrophos was used.

Key points

- **Improves palatability and helps maintain healthy pastures**
- **Better performing stock**
- **Healthier crops**
- **Improves feed value of grass**

General background notes on sodium:

- Uptake of sodium is stimulated by applications of nitrogen
- Deficiencies occur when herbage levels fall below 0.15% Na
- Feeding standards recommend not less than 0.15% Na in dietary dry matter for milking cows and 0.3 to 0.5% for optimum palatability

Conversion: [Convert Na to Na_2O x 1.35]

Calcium up to 18% as Ca0

Fibrophos is not a liming product but contains a useful level of calcium. Applied on a regular basis, Fibrophos can help to reduce soil pH and enhance the availability of other nutrients available in the product and soil.

Key points

- **Helps maintain soil pH levels**
- **Calcium is an important nutrient for animals**
- **Saves liming costs over time**
- **Improves availability of nutrients by adjusting pH**
- **Improves stock performance**
- **Improves potato skin finish**

General background notes on calcium:

- Main grassland areas becomes acidic unless limed regularly.
- There is a financial penalty on most crops when pH falls below 6.

Common effects of underliming are:

- Deteriorating soil structure
- Reduced yields
- Reduced quality
- Reduce fertiliser efficiency
- General deterioration of swards
- Increase in physiological diseases
- Improvement of pH levels to obtain maximum benefit of other plant nutrients

Conversion: [Convert Ca to CaO x 1.39]

6 Trace Elements in Fibrophos

Fibrophos contains a wide range of useful trace elements, not normally available in other fertilisers. Regular applications of Fibrophos ensure soils have good levels of vital trace elements so ensuring deficiencies of any one of them are not limiting yield potential.

Many of the trace elements from Fibrophos are taken up by herbage and therefore can significantly improve the health status of livestock.

The average removal of trace elements for various crops

CROP	Yield (t/ha)	Trace Element Removal			
		Mn	Cu	B	Zn
Grain	7.5	188	30	6	188
Straw	3.75	225	9	23	56
Cereals Total	**11.25**	**413**	**39**	**29**	**244**
Roots	40	280	40	120	160
Tops	20	160	20	120	60
Sugar Beet Total	**60**	**440**	**60**	**240**	**220**
Potato tubers	**40**	**160**	**80**	**28**	**160**
Oilseed Rape, whole crops	**3** (seed)	**700**	**70**	**350**	**350**
Grass					
Silage	45	900	90	90	450
Hay	4.5	585	27	32	180

NOTE: Oilseed Rape and Grassland Remove trace elements in larger amounts compared to cereals crops. (Adapted from John Archer "*Crop Nutrition and Fertilizer Use*".)

Iron up to 4000ppm as Fe

Key points

The iron in Fibrophos:

- **Is involved in the production of chlorophyll**
- **Is a component of many enzymes associated with energy transfer, nitrogen fixation, and lignin formation**
- **Is associated with sulphur in plants to form compounds that catalyse other reactions**

The specific benefits of Fibrophos

Fibrophos helps to correct deficiencies which are found mainly on high pH soils, or some acid, sandy soils with low organic matter and on poorly aerated or compacted soils.

Manganese up to 1200ppm as Mn

Key points

The manganese in Fibrophos:

- **Is necessary for photosynthesis**
- **Improves nitrogen assimilation so helps reduce loss of yield**
- **Is essential for plant metabolism**
- **Improves pollen germination and resistance to root pathogens - so improves plant health**

The specific benefits of Fibrophos

Fibrophos helps to correct deficiencies which are found mainly on organic soils, high pH soils, or some sandy soils with low organic matter and where land has been over-limed.

Copper up to 300ppm as Cu

Key points

The copper in Fibrophos:

- **Is necessary for carbohydrate and nitrogen metabolism**
- **Is necessary for lignin synthesis to strengthen cell walls and prevent wilting**

The specific benefits of Fibrophos

Fibrophos helps to correct deficiencies which are found mainly on sandy soils low in organic matter. Copper uptake by the plant decreases as soil pH increases and also where phosphorus and iron availability in soils is high.

Boron up to 130ppm as B

Key points

The boron in Fibrophos:

- **Is primarily related to cell wall formation**
- **Is necessary as deficiencies can lead to stunted growth**
- **Is related to sugar transportation, flower retention and pollen formation**

The specific benefits of Fibrophos

The Boron in Fibrophos helps correct deficiencies found mainly in acid, sandy soils in regions of high rainfall, and those with low soil organic matter. Deficiencies are worse during drought periods when root activity is restricted.

Molybdenum up to 5ppm as Mo

Key points

The molybdenum in Fibrophos:

- **Is involved in enzyme systems relating to nitrogen fixation by bacteria growing symbiotically with legumes**
- **Is involved in nitrogen/sulphur metabolism and protein synthesis**
- **Has a significant effect on pollen formation, so fruit and grain formation are affected in molybdenum-deficient plants**

The specific benefits of Fibrophos

The molybdenum in Fibrophos helps correct deficiencies mainly on acid, sandy soils. Uptake by plants increases with increased soil pH, which is opposite that of the other micronutrients.

7 Fibrophos for grassland

Fibrophos helps to raise the soil phosphate and potash indices on the poorest soils and together with all the other key nutrients naturally contained within it, will help to increase yields across the farm.

Regular applications of Fibrophos ensure that phosphate and potash, so vital for grass establishment, are maintained and those important secondary and trace elements which are often overlooked, are boosted to maximise grass yield and improve the health of your livestock.

Fibrophos as a source for Grass

OBJECTIVE AND METHOD

Levington Agriculture Ltd | *Ian Richards*

The trial set out to evaluate Fibrophos as a phosphate source when applied to grassland. The trial ran for three years. The soil chosen was a sandy clay with a pH of 5.9. P & K indices were both 1. A randomised block, replicated 4 times was chosen.

A uniform dressing of N & K was applied in the spring and a single cut taken. Fibrophos was compared with TSP and Rock Phosphate.

Results

	Grass DM			P yield Kg/ha		
	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3
Control	8.86	8.32	3.44	26.7	22.2	10.6
TSP	9.81	8.81	3.61	32.9	25.5	12.2
Gafsa	9.33	8.81	3.55	27.7	25.4	11.6
Fibrophos	9.70	8.93	3.68	31.4	26.7	12.1

*One cut only

Conclusion

"Fibrophos is an effective phosphate source similar to TSP and superior to phosphate rock in both grass dry matter and phosphate yield"

Ian Richards, *Soil Agronomist*

7 Fibrophos for grassland

Fibrophos will provide that immediate PK boost for grass establishment and, as shown in trials, goes on to release nutrients to the soil as the plant requires it over an extended period. This steady release of phosphate and potash is in line with plant demand, making plants healthier and stronger.

The long-lasting benefits of the phosphate have been shown in trials to benefit grass well beyond the first year after application making it a truly continuous source of plant nutrients.

Nutrient Removal Table

Guidelines for calculation of phosphate, potash and magnesium removal in grass crops.

	Kg/t of fresh material removed	
	P_2O_5	K_2O
Fresh grass (15-20% DM)	1.4	4.8
Silage (25%DM)	1.7	6.0
Silage (30% DM)	2.1	7.2
Hay (86% DM)	5.9	18.0

(Source: RB209/2010)

8 Fibrophos for cereals

Fibrophos helps to raise the soil phosphate and potash indices on the poorest soils and together with all the other key nutrients naturally contained within it, will help to increase yields across a much more productive acreage of your farm.

Regular applications of Fibrophos ensure that phosphate and potash, so vital for crop establishment, are maintained across your farm and those important secondary and trace elements which are often overlooked, are boosted to maximise crop yield.

Field Trial on Spring Barley

OBJECTIVE AND METHOD	
Levington Agriculture Ltd	*Ian Richards*

To evaluate the effectiveness of P & K in Fibrophos when applied to spring barley.

A replicated trial was carried out by Levington Agriculture on spring barley on soil with a pH of 7.5, P index 1 (low) and K index 0 (very low).

Fibrophos was compared with TSP and MOP.

Results

Yield:	There was an upward trend in yield with increasing rate of Fibrophos for both phosphate and potash. The difference in yield from untreated control and positive rates of Fibrophos were significant by Duncan's MRT. Less response was seen with MOP. Highest yields were obtained with the Fibrophos application.
Bushel weight:	There was a significant increase in grain bushel weight with Fibrophos. There was no significant increase in grain bushel weight from TSP and MOP.
Grain analysis:	Fibrophos increased the uptake of potash and sulphur in the grain compared with TSP and MOP. N:S ratios measured in the Fibrophos treatments gave good ratios which indicated deficiencies were unlikely. Fibrophos significantly decreased the N content of grain at the lower rates of application.

Conclusion

"Fibrophos increased yields for both phosphate and potash treatments. Highly significant increases in grain specific weight were found."

Ian Richards, *Soil Agronomist*

Field Trial on Winter Wheat

OBJECTIVE AND METHOD	
Scottish Agricultural College	*David Cranstoun*
To compare Fibrophos alongside TSP/MOP on 4 replicated field plots. **Results** Although not statistically significant the Fibrophos treated plots out-yielded those treated with TSP and MOP. The soil P & K residual levels of fertiliser were also higher after Fibrophos than TSP and MOP.	

Conclusion

"For farmers trying to build up soils with low levels it is likely that Fibrophos would be the more effective choice in nutrient terms."

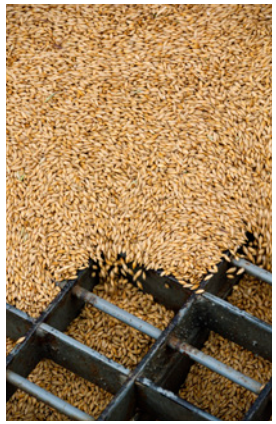
David Cranstoun, *SAC*

Nutrient Removal Table

Guidelines for calculation of phosphate, potash and magnesium removal by crops.

		kg/t of fresh material		
		P_2O_5	K_2O	MgO
Cereals	grain only	7.8	5.6	2
	grain plus straw			
	winter wheat or barley	8.4	10.4	2.6
	spring wheat or barley	8.6	11.8	2.7
	winter/spring oats	8.8	17.3	n/d
Oilseed rape	seed only	14	11	2
	seed plus straw	15.1	17.5	n/d
Straw	winter wheat or barley	1.2	9.5	1.2
	spring wheat or barley	1.5	12.5	1.3
	oilseed rape	2.2	13	1.3
Potatoes	tubers	1	5.8	0.3
Sugar beet	roots only	0.8	1.7	0.5
	roots & tops	1.9	7.5	n/d

(Source: RB209/2010)



9 Fibrophos for root crops

The five nutrients most likely to affect sugar beet are potassium (K), sodium (Na), phosphorous (P), magnesium (Mg) and sulphur (S). In addition, boron (B) deficiencies are known to damage beet yields. It is essential to have adequate quantities of these nutrients to prevent loss of quality or yield. All are supplied by Fibrophos.

Trials were carried out to evaluate the benefits of Fibrophos on sugar beet which were inconclusive. However, Fibrophos was seen to yield as well when compared to TSP and MOP with higher sugar yields in the Fibrophos plots suggesting that Fibrophos is as good a fertiliser for beet as other fertilisers.

Evaluation of Fibrophos for Sugar Beet

OBJECTIVE AND METHOD	
Levington Agriculture Ltd	*Ian Richards*
The trial was designed to gain information on Fibrophos Extra-K as P & K source for sugar beet at two sites in Cornwall and Suffolk. The treatments were factorially combined so that each P & K source was tested at every rate of application.	
Results	
The plant vigour was significantly better on the treated plots and by June the rate responses were visible. Colour of the beet leaves was likewise better. By the end of August, the average score for vigour from the Fibrophos treatment was significantly greater than that from TSP/MOP. Both Fibrophos and TSP/MOP tended to increase sugar content.	

Conclusion

"Fibrophos was as effective as TSP/MOP in promoting growth of sugar beet as demonstrated by colour and vigour assessments during the season". Fibrophos application increased root sugar content.

Fibrophos as a P&K source for potatoes

OBJECTIVE AND METHOD	
Envirofield	*Iain Turner*
Maincrop potatoes grown on randomised replicated plots were compared with conventional fertiliser as TSP and MOP.	

Conclusion

There were significant yield differences where fertiliser was applied but not between Fibrophos and the comparable TSP and MOP suggesting that Fibrophos is a suitable nutrient for potatoes. The results of the soil analysis showed that Fibrophos can improve the soil K index by at least as much as MOP. The results suggest that Fibrophos is as effective as conventional nutrient sources.

10 Spreading Fibrophos

Physical Spreading

Most moving belt machines will handle Fibrophos satisfactorily, although a reduced spreading width must be allowed for due to the powder properties. Spreading greater than widths of 12m is not recommended.

Fibrophos is best spread using experienced contractors who have the correct calibrated machinery.

All fertiliser application should follow the Code of Good Agricultural Practice and based on the nutrient required by each crop to ensure the best financial return giving due consideration to the environment.

Application rates for Fibrophos 0-12-12 will depend on a wide range of factors but are typically applied at 400-700Kg/ha and thereafter annually as required.

Recommended application rates of Fibrophos

Application rates based on 0-12-12		
Arable Crops	**Kg/ha**	
Soil P index 0 or 1	850	Every 1-2 years
Turnips or swedes	725	In the seedbed
Cereals/Oilseed rape	500	On heavy clay soils
Cereals/Oilseed rape	725-850	Rotational manuring every 2-3 years
Grassland	**Kg/ha**	
Soil P index 0 or 1	750-850	Every 2-3 years
Grass/clover swards	725	Every 3 years
Permanent pasture or low P soils	600	Annually until deficiency corrected
Grassland establishment	500	In the seedbed

Application rates based on 0-9-18		
Silage: One cut system	475	Annually to remove potash removal
Multi-cut/first	475	
Multi-cut/further cuts	400	
Grassland establishment	500	In the seedbed

Phosphate

- Does not get locked up as readily as soluble phosphate
- Not only immediate performance, but also sustained performance
- Can be applied at any time of year
- Available to all crops
- Flexible product. Simple and convenient to use across the farm
- Longer lasting over several years
- Can be applied on rotational basis

Potash

- Both water and citric soluble
- Both rapid and controlled release
- More effective performance
- Potash availability in line with crop growth demands
- Stronger, healthier plants

Sulphur

- Corrects sulphur deficiencies so less disease
- Higher yields
- Better quality
- Free sulphur
- Helps correct soil's N/S ratio
- Efficient and effective use of expensive applied nitrogen
- Higher crop and grass yields
- Better quality proteins

Calcium (Lime)

- Helps reduce and maintain soil pH
- Saves liming costs over time
- Improves availability of nutrients
- Improves livestock performance

Magnesium

- Helps reduce of Staggers

Sodium

- Improves palatability

Great Levels of other nutrients

- Provides secondary elements at no extra cost
- Provides wide range of trace elements at no extra cost
- Immediate crop/animal performance improvement
- Reduces risk of yield loss due to trace element deficiencies

Coarse Powder

- Full coverage of soil by all nutrients
- Optimum uptake of nutrients by plants
- Better overall performance

Experienced Contractor Applied

- Saves farm labour to do more productive jobs
- Improves management flexibility
- Reduces cost so can increase return
- Reduced wear and tear on machinery
- Lower capital costs
- Can improve cash flow
- Contractor is expert in fertiliser application - accurate application - good job done
- Maximum response to applied fertiliser

Can be applied every 2 or 3 years rotational manuring

- Saves money
- Saves spreading costs
- Saves time

Natural Product

- Safe product
- Does not contain toxic chemicals
- Low heavy metals content
- Low cadmium content
- Has similar balance of nutrients to wheat.
- Confidence that land is being replenished with those nutrients removed.
- Not mining the soil!

Bulk delivery to field

- Does not ties up storage space
- Increases storage options
- Improves farm flexibility
- No disposal of bags
- No broken bags
- No loss of product
- Only pay after delivery
- No pre-payment

Environmentally Responsible

- Recycles important and scarce nutrients
- Avoids use of scarce mined resources
- Produced in UK so saves damaging environmental transport costs
- Reduces import costs of PK
- Nitrogen free so can be applied at time to suit
- Enables better choice and use of straight nitrogen

Low cost

- Better value than TSP/MOP
- Better value than 0-24-24
- Allows more effective sourcing of straight nitrogen
- More effective use of other applied nutrients

Range of Grades

- Range of grades to suit most cropping and soil situations

What is Fibrophos?

Fibrophos is an environmentally friendly, renewable PK fertiliser consisting of phosphate, potash, sulphur, magnesium, calcium, sodium and significant quantities of essential trace elements required by crops and grass to achieve high yields.

What are the major benefits of Fibrophos?

Fibrophos provides P&K in both immediately available and long lasting forms, providing available plant nutrients throughout the growing season and also replenishes nutrients removed to improve soil fertility.

Fibrophos recycles nutrients removed from agriculture back into agriculture so reduces amounts of nutrients mined and the environmental costs of transporting them.

The type of potash and magnesium contained in balance reduces risk of grass staggers. Fibrophos contains calcium and sulphur, so helps maintain pH & soil structure, maximises the uptake of nitrogen and improves protein synthesis. Sodium will improve the palatability of grass and help maintain healthy pastures.

Trials have shown uptake of magnesium better with Fibrophos than where TSP and MOP applied.

How does it work?

It's not a blend but it replaces nutrients in the same ratio removed by the growing crop. The immediate effects are a big PK boost. Unlike some other fertilisers there is a longer term benefit with the release of nutrients steadily over time, building balanced, stable soil and healthier, stronger crops.

How is Fibrophos produced?

It comes from predominantly deep litter poultry manure from cereal fed chickens, which is incinerated at 850°C in biomass power stations, producing a safe, pathogen free, ash by-product which is conditioned into a pure agronomically effective fertiliser containing all the plant nutrients (except nitrogen) which were present in the poultry feed.

How long has Fibrophos been produced?

For over two decades arable and grassland farmers have seen the benefits of Fibrophos and demand grows year on year. Research has confirmed that the phosphate and potash in Fibrophos is as effective as TSP and MOP and that secondary and trace elements offer an additional bonus. It works and it works very well.

The P&K is slow release, does this mean it won't work quickly enough at low indices??

Not at all. The P&K are in both immediately available and sustained forms, providing nutrient throughout the growing season.

Extensive trials have shown that Fibrophos is a very effective source of phosphate across a wide range of agricultural soil types throughout the UK. The phosphate in Fibrophos is more than 80% soluble in 2% citric acid and nearly half is soluble in neutral ammonium citrate providing a long lasting as well as immediate supply to the growing crop. Trials showed that application of Fibrophos to both acid and alkaline grassland or arable crops significantly increased available soil phosphate within one month and this increase was maintained for at least 12 months. Citric soluble phosphate helps build up soil fertility over time.

The potash in Fibrophos is less soluble than inorganic fertilisers (50% water soluble), the uptake of potash is less rapid, avoiding luxury uptake that can cause staggers. ADAS trials carried out by ETSU for the DTI confirmed that the potash is very quickly available and is as effective as MOP. Any potash remaining will become available to the plants in the longer term, making Fibrophos a very effective fertiliser for grass and arable situations. Because the potash is available in line with crop growth demands, plants become healthier and stronger.

Since these early trials well over 1 million tonnes of Fibrophos has been sold nationwide for both cereal and grassland applications.

Many of the sales made today are to farmers who have used Fibrophos across their farms for over 20 years - thus endorsing the work carried out by ADAS.

Will the trace elements make much difference?

Trace elements are essential nutrients for all growing crops and need replacing. Acute trace element deficiencies need supplementary treatment but regular applications of Fibrophos will enrich the mineral composition of the soil.

Fibrophos puts back trace elements in the same proportion as they were initially removed – because it is produced from combusted (cereal rich) poultry manure.

There are other, similar products on the market. What's different about this one?

Fibrophos is produced from burning the same consistent fuel source all the time. This means the physical quality and nutrient analysis of the product do not vary. It's the same time after time. Fibrophos Ltd are members of the AIC and all product is sold under FIAS regulations so you may be assured that you get what is declared on the Statutory Statement which accompanies every load. Beware of other fertilisers which are not sold in this way.

I've used poultry manure as a fertiliser. Why should I want it burnt to an ash?

Firstly, incineration ensures there are no pathogens. Secondly, poultry manure cannot be applied during the wet winter months due to problems with nitrogen leaching - the manufacture of Fibrophos takes poultry manure throughout the year thus avoiding leaching issues. Thirdly, by creating a consistent quality ash product it makes it easier to spread accurately.

What about traceability of the poultry litter fuel source?

Fibrophos is sold under a Quality Protocol for Poultry Litter Ash (PLA) set by the Environment Agency. The poultry litter fuel is only sourced from British poultry farms and is closely monitored for chemical composition and every delivery to the power station can be traced to a particular poultry farm from which it came.

At 18% calcium, 4% magnesium and a neutralising value of 15% is it just expensive, low grade lime?

No. The calcium and magnesium are in readily available forms and are valuable plant nutrients. Fibrophos is not a liming product but, when used regularly, will help maintain soil pH.

How does Fibrophos compare with the cost of other fertilisers?

Fibrophos is competitively priced with all P&K fertilisers across the UK. In addition, the secondary and trace elements in Fibrophos are supplied at no extra charge so provide a cost effective way to replace nutrients removed or to correct deficiencies in your soil - giving you peace of mind.

How does Fibrophos benefit the environment?

Fibrophos is naturally produced from totally natural and organically derived origins, using renewable sources of chicken litter and wood waste such as bark and chippings. Its use as a fertiliser replaces mined phosphates and potash which are

costly on the environment to both mine and import.

The power stations generate in excess of 100MW of renewable electricity, helping reducing the reliance on non-renewable sources of oil and coal. Because the carbon in the litter was fixed from the air recently, burning it does not add new carbon dioxide into the atmosphere so helps reduce accumulation of greenhouse gases.

Is it approved for organic use?

No. Although derived entirely from organic material, it cannot be used on organic farms as the poultry litter is not exclusively from organic farms.

How is Fibrophos delivered?

Fibrophos is a bulk fertiliser available for delivery or collection across the country – typically in bulk 29t loads.

It is ideally tipped on a hard, free draining surface, just prior to time of application. It is weather proof and stands getting wet. Being delivered in bulk there are no bags or packaging to dispose of or recycling costs.

Will it spread evenly?

Absolutely no problem. We have taken great care in handling and treatment of the product to ensure it arrives on farm in excellent condition, suitable for accurate and even spreading.

How is it applied & what are the typical application rates?

Fibrophos is a coarse powder and therefore should be spread using a contractor with the appropriate experience and equipment for spreading this type of material. It is recommended to employ a trailed spreader with a moving belt floor system or similar, such as those found on Atkinson, Bredal, Land Drive or Transpread machines.

Typical application rates range from 300-900kg/ha (4-6.5cwt/ac). It is the responsibility of the user to read and understand the Material Safety Data Sheet, to ensure that the product is fit for purpose, and to apply the product in accordance with the DEFRA Code of Good Agricultural Practice. Farmed animals must not be allowed access to the land for at least 21 days following application to land.

How can I buy Fibrophos?

Fibrophos is available across the UK though a comprehensive network of main distributors and merchants.

Contact 0800 690 6209 to find your nearest merchant or email info @fibrophos.co.uk

fibrophos

PK & trace element fertiliser

V4 May2024

Call 0800 690 6209 info@fibrophos.co.uk www.fibrophos.co.uk