



HARVEST MINERALS

Harvest Minerals Limited / Index: LSE / Epic: HMI / Sector: Mining

3 July 2017

Harvest Minerals Limited (“Harvest” or the “Company”) Excellent Agronomic Results from the Arapua Fertiliser Project

Harvest Minerals Limited, the AIM listed fertiliser development company, is pleased to provide an update on the latest results from ongoing agronomic test work at its Arapua Fertiliser Project in Brazil in conjunction with accredited universities and research bodies.

Highlights

- Multiple soil incubation tests completed so far, which confirm that the Company’s product, KPfétil, has a positive agronomic efficiency, increasing the potassium (‘K’), phosphate (‘P’), silicate (‘Si’), calcium (‘Ca’), and magnesium (‘Mg’) in the pH of the soil and correcting the soil acidity
- Visual comparisons of the recently harvested rice crop show that larger, healthier plants develop when KPfétil applied
- Results indicate that KPfétil works effectively as a multi-nutrient, slow release remineraliser and that the proportion of product applied could be increased with each application until it replaces other sources of P and K such as fertilisers and soil improvers
- Initial production of 50,000 tonnes of KPfétil completed April 2017 under a trial mining permit – current resource of 13 million tonnes
- On track to make an application to the Brazilian Ministry of Agriculture, Livestock and Supply (‘MAPA’) Q3 2017, with the aim of certifying KPfétil as a remineraliser by the end of 2017
- Continued focus on achieving first sales in Q3 2017, in advance of KPfétil certification

Harvest Executive Chairman Brian McMaster said, *“The agronomic efficiency results for KPfétil, our multi-nutrient, direct application natural fertiliser, are excellent, especially considering KPfétil can be a replacement for conventional sources of phosphate and potassium. In ongoing tests conducted by independent university partners, the crops are reacting extremely well and we expect further positive results in due course. We are also continuing tests on coffee plants at Veloso Agropecuária Empreendimentos E Participações Ltda, but these aren’t a requirement of the application to MAPA.*

“We are excited about the prospects of KPfétil due to the many distinct advantages over imported products: it is a multi-nutrient, direct application, natural fertiliser composed of weathered potassium and phosphate-rich lava; and it is excavated at surface and processed on site, translating into a low cost, low capex operation. Importantly, we have a 13 million tonne resource, based on drilling only 6.7% of the known mineralisation, and can mine up to around 450,000 tonnes per annum using our existing capital infrastructure, which translates into a current mine life of over 100 years.



HARVEST MINERALS

“Going forward, with the test data flowing in, we are starting the process of registering KPfertil with MAPA in Q3, and once officially certified, we can better market and distribute the product; this should enable us to achieve first product sales in Q3 this year.”

This announcement contains inside information for the purposes of Article 7 of EU Regulation 596/2014.

Further Information

Harvest is focused on developing its 100% owned Arapua multi-nutrient potash and phosphate direct application natural fertiliser (‘DANF’) project in Brazil. The totally natural product being produced at Arapua is branded as KPfertil and mined from surface with limited processing required before sale. Initial production of 50,000 tonnes was completed in April 2017 under a trial mining permit; some of this product has been used to conduct the ongoing agronomic tests.

Registration as a Remineraliser

The Company is initially planning to register KPfertil as a “remineraliser” or “stonemeal”, which is a product classification introduced by MAPA in March 2016 to assist in accrediting local, organic nutrient products. Following registration as a remineraliser, the Company can, if it chooses, pursue a further registration as a “fertiliser” to broaden the market.

To be registered as a remineraliser, a MAPA approved institution must test the product as follows:

- **Chemical and physical analysis** - to confirm the product meets minimum specifications and that it is not hazardous.
- **Kinetic studies (incubation and leaching)** - to demonstrate the product is able to release nutrients into the soil and how quickly they are leached from the soil.
- **Agronomic efficiency test work (growth tests)** - to demonstrate the nutrients can be utilised by plants and that the product works effectively as a remineraliser.

The Company has commissioned a range of tests, which are being conducted by MAPA approved institutions as shown in table 01.



HARVEST MINERALS

Table 01 – Status of test work required for product registration.

Test	Institution(s)	Status
Chemical and Mineralogical Analysis	Campo, UFU, IBRA	Complete
Kinetic Studies - incubation	UFU	Complete
Kinetic Studies - Leaching	UFU	Results due Q3
Growing tests with 1st crop (1 cycles x 2 soils)	UFU	Rice harvested - results due July
Growing tests with 2nd Crop (1 cycle x 2 soils)	UFU	Underway

These results will be submitted to MAPA in Q3 as part of the product registration process.

Results of the Tests

Chemical and Physical Analysis

All the required chemical and physical test work was completed last year at the Centro de Tecnologia Agrícola e Ambiental ('CAMPO'), IBRA and the Federal University of Uberlândia ('UFU'). The results were announced on 23 August 2016, with KPfertil exceeding all the minimum requirements, as summarised in Table 02 below:

Table 02 – Average results of physical and chemical analysis carried out last year

Parameter	Unit	Specification	KPfertil	Pass
Water Retention Capacity (WRC)	%	-	56	☑
Cation Exchange Capacity (CEC)	mmol/kg	-	420	☑
Electrical Conductivity (EC)	mS/cm	-	0	☑
Potential Hydrogen (pH)		-	6.59	☑
Water Content (WC)	%	-	5.06	☑
Total Bases = CaO + MgO + K ₂ O	%	≥ 9% wt.	16	☑
K ₂ O	%	≥ 1% wt.	4	☑
SiO ₂ free	%	≤ 25% vol.	0	☑
P ₂ O ₅	%	-	3.45	☑
CaO	%	-	6	☑
MgO	ppm	-	6	☑
As	ppm	≤ 15 ppm	1	☑
Cd	ppm	≤ 10 ppm	< 0.2	☑
Hg	ppm	≤ 0.1 ppm	< 0.01	☑
Pb	ppm	≤ 200 ppm	< 0.2	☑



HARVEST MINERALS

Kinetic Studies (incubation and leaching)

The kinetic studies evaluate how quickly KPfértil is able to release nutrients of K, P, Ca, Mg and Si into the soil (incubation) and how quickly they are leached (leaching) and to determine the corrective effect on the soil pH as well as test the calcium silicate equivalent value. The tests are being carried out at the UFU.

Incubation Tests

The incubation studies have now been completed and the results are very encouraging. All results indicate that KPfértil increases the K, P, Si, Ca, and Mg in the pH of the soil and acts to correct the soil acidity both as a powder and filler over a short time frame and as a slow release. The test results also indicate that there will be a strong residual effect and much lower level of leaching of nutrients. This suggests that the proportion of KPfértil applied could be increased with each application until it completely replaces other sources of K and P such as fertilisers and soil improvers. This would significantly increase the potential for KPfértil, which is a totally natural product, having undergone no industrial processing to improve grades or solubility. The detailed results are contained in Appendix 1.

Leach Testing

The Leaching tests evaluate the loss in K due to leaching from the soil compared to traditional KCl. The leach tests are ongoing and the results are expected in July.

Agronomic Efficiency (Growth tests)

The agronomic efficiency tests determine if the plants are able to use the nutrients applied to the soil. At the UFU, the Company is conducting growth tests on two crops (rice and bean) in two types of soil (clay rich and sandy) to test the reactivity and availability of nutrients from KPfértil to the plants and to determine its agronomic value. All these tests are being conducted in glasshouses. The rice plants have now been harvested and visually show that larger, healthier plants develop when KPfértil is applied. The final results of the rice trials are due in July with the bean trials still outstanding.



HARVEST MINERALS



Figure 1 – Rice crop cultivated in clayey “Cerrado” soil – From left to right Control, KCl, KCl + SFT, KPfertil

Appendix 1

Detailed Results of the Soil Incubation Test

The soil incubation tests were performed in two different types of soil, classified as clayey (40% of clays) and sandy (11% of clay). KPfertil was incorporated in doses from 50g to 300 g of soil inside plastic pots. For comparative purposes, treatments were also made using conventional sources of K, P, Si, Ca as well as a control treatment without any product applied. All tests were done with KPfertil in filler grain size (100% < 0.3 mm) and powder grain size (100% < 2.0 mm, 70% < 0.84 mm and 50% < 0.3 mm).

After 60 days (incubation period), the samples were dried, sieved and chemically analysed to determine pH value and the contents of K, P, Si, Ca and Mg, following the official methodology according with MAPA.

The results for KPfertil were positive in comparison to conventional sources of nutrients.

1 – Potassium in Soil:



HARVEST MINERALS

The analysis for K was done using Mellich and Resin chemical extraction. For the comparative treatment, standard KCl (Muriate of Potash) was applied as a source of K with a grade of 60% K₂O. The results indicate that KPfertil increased the K content in both clayey and sandy soil (Table 1).

Table 1 – K grades in the clayey and sandy soil, using Mellich and Resin extraction.

Treatment	Dose K ₂ O mg kg ⁻¹	Clayey Soil		Sandy Soil	
		K mg dm ⁻³ (Mellich)	K mg dm ⁻³ (Resin)	K mg dm ⁻³ (Mellich)	K mg dm ⁻³ (Resin)
KCl	100	104.2	78.8	121.3	64
Control	0	22.5	15.0	13.8	9.0
KPfertil (filler)	50	23.9	16.0	15.1	14.4
KPfertil (filler)	100	27.4	16.7	17.3	15.1
KPfertil (filler)	200	31.6	20.3	19.1	31.3
KPfertil (filler)	300	33.0	20.9	21	34.7
KPfertil (powder)	50	25.0	15.5	15	11.6
KPfertil (powder)	100	32.1	15.8	16.8	12
KPfertil (powder)	200	40.2	17.8	18.4	20.7
KPfertil (powder)	300	43.2	18.1	20	22.5

2 – Phosphate in Soil:

The analysis for P was conducted using Mellich and Resin chemical extraction. Super triple phosphate ('SFT') with a grade of 45% P₂O₅ was applied as a source of P for the comparative treatment. The results again indicate that KPfertil increased the P content in both clayey and sandy soil (Table 2).



HARVEST MINERALS

Table 2 – P grades in the clayey and sandy soil, using Mellich and Resin extraction.

Treatment	Dose P ₂ O ₅ mg kg ⁻¹	Clayey Soil		Sandy Soil	
		P mg dm ⁻³ (Mellich)	P mg dm ⁻³ (Resin)	P mg dm ⁻³ (Mellich)	P mg dm ⁻³ (Resin)
SFT	95	48.5	68.8	62.5	80.3
Control	0	0.4	0.8	0.5	1.7
KPfétil (filler)	48	0.4	2.3	1.8	3.3
KPfétil (filler)	95	0.5	3.2	2.4	4.4
KPfétil (filler)	190	0.7	8.7	6.4	9.9
KPfétil (filler)	285	0.9	12.7	9.3	14
KPfétil (powder)	48	0.6	1.6	1.4	2.9
KPfétil (powder)	95	0.7	2.2	1.8	3.4
KPfétil (powder)	190	1.7	5.5	4.5	6.9
KPfétil (powder)	285	2.3	7.8	6.4	9.5

3 – Silica in Soil:

For the silica in soil tests, Wollastonite with a 24% Si content was applied for the comparative treatment. As for the K and P analysis, KPfétil increased the Si content in both clayey and sandy soil (Table 3).

Table 3 – Si grades in the clayey and sandy soil.

Treatment	Dose Si mg kg ⁻¹	Clayey Soil Si mg dm ⁻³	Sandy Soil P mg dm ⁻³
Wollastonite	300	10.0	7.9
Control	0	5.2	2.5
KPfétil (filler)	300	5.8	2.6
KPfétil (filler)	600	6.2	2.6
KPfétil (filler)	1200	7.0	2.8
KPfétil (filler)	2400	8.4	2.8
KPfétil (powder)	300	5.8	2.5



HARVEST MINERALS

KPfertil (powder)	600	6.3	2.6
KPfertil (powder)	1200	7.0	2.7
KPfertil (powder)	2400	8.5	2.8

4 – Calcium and Magnesium in Soil:

For the comparative treatment calcium carbonate (CaCO_3) with a grade of 40% Ca was applied. Again, there was a positive increase in both Ca and Mg nutrients in the clayey and sandy soil after the incubation with KPfertil (Table 4).

Table 4 – Ca and Mg grades in the clayey and sandy soil.

Treatment	Dose Ca and Mg kg^{-1}	Clayey Soil		Sandy Soil	
		Ca cmol dm^{-3}	Mg cmol dm^{-3}	Ca cmol dm^{-3}	Mg cmol dm^{-3}
CaCO_3	110	1.3	-	1.2	-
Control	0	0.6	0.2	0.6	0.2
KPfertil (filler)	55	0.7	0.3	0.7	0.4
KPfertil (filler)	110	0.9	0.5	0.8	0.8
KPfertil (filler)	220	1.1	1.1	1.1	1.4
KPfertil (filler)	440	1.4	1.3	1.4	1.9
KPfertil (powder)	55	0.7	0.4	0.6	0.4
KPfertil (powder)	110	0.8	0.7	0.7	0.6
KPfertil (powder)	220	0.9	1.0	0.8	0.9
KPfertil (powder)	440	1.2	1.3	0.9	1.3

5 – Soil pH:

The pH potential in the soils was tested after the incubation period with the aim of reducing the soil acidity. KPfertil application as both a filler and a powder had a positive effect in the soil acidity and so would act as a soil corrective (Table 5).



HARVEST MINERALS

Table 5 – pH in the clayey and sandy soil.

Treatment	Dose Ca mg kg ⁻¹	Clayey Soil pH CaCl ₂	Sandy Soil pH CaCl ₂
CaCO ₃	83	5.1	5.3
Control	0	3.5	3.6
KPfértil (filler)	300	3.7	3.7
KPfértil (filler)	600	3.8	3.9
KPfértil (filler)	1200	4.3	4.1
KPfértil (filler)	2400	4.6	4.3
KPfértil (powder)	300	3.7	3.7
KPfértil (powder)	600	3.8	3.9
KPfértil (powder)	1200	4.3	4.1
KPfértil (powder)	2400	4.6	4.3

For further information please visit www.harvestminerals.net or contact:

Harvest Minerals Limited	Brian McMaster	Tel: +61 8 9200 1847
Strand Hanson Limited (Nominated Financial Adviser)	James Spinney Ritchie Balmer	Tel: +44 (0)20 7409 3494
Mirabaud Securities LLP (Broker)	Rory Scott	Tel: +44 (0)20 7878 3360
Beaufort Securities Ltd (Joint Broker)	Jon Belliss	Tel: +44 (0)20 7382 8300
Whitman-Howard Ltd	Grant Barker	Tel: +44 (0)20 7659 1225
St Brides Partners Ltd	Isabel de Salis Olivia Vita	Tel: +44 (0)20 7236 1177