



## Replenish™

### Phosphate Organic Fertilizer 0-17-0-12 Montana Dryland PAC

### Part 1 of the Replenish™ Keep It Simple Series

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**Replenish™** is a nutritional soil amendment containing rock phosphate (RP), elemental sulphur (ES) and a proprietary activated compost (PAC) that provides plant essential phosphorus (P) and sulphur (S) biologically throughout a crop's growing cycle.

The application of **Replenish™** creates billions of micro-sized biological RP fertilizer production factories in the soil. The accelerated oxidation of ES (conversion of ES to crop available  $\text{SO}_4$ -S, initially as  $\text{H}_2\text{SO}_4$ ) facilitated by PAC, creates a halo of acidity around each ES/RP particle that releases crop available P, S and other nutrients from both the **Replenish™** and the soil.

#### P and S Uptake Balance is Absolutely Critical

As an industry, we have mined soil P and S (also K and micronutrients) for decades to the point where action is desperately needed. Based on total nutrient uptake requirements, different crops require a specific P:S uptake ratio to optimize yield and quality (generally between 0.6 to 1.8).

For oilseeds (mustard, flax) the ratio is roughly 0.6 which means for every 1 lb of S the crop also requires 0.6 lbs of P (or 1.4 lbs of  $\text{P}_2\text{O}_5$ ). For spring wheat the P:S ratio is 1.4, while corn is 1.7.

#### Why is S Essential?

- Formation of chlorophyll and ultimately photosynthetic efficiency
- Efficient amino acid and protein production
- Oil synthesis
- Enzyme activation
- Plant stress relief
- Enhanced utilization of all other nutrients

#### Why is P Essential?

- Energy transfer
- Photosynthesis
- DNA integrity and genetic transfer
- Nutrient transport
- Maturation

Approved input under the Canadian Organic Standards and the USDA National Organic Program.

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### Why is Replenish™ such a unique product?

The biological release of P and S from **Replenish™** provides the necessary P:S balance for all crops, enhancing soil health in a natural, low saline manner.

### Third Party Greenhouse Research (Winter 2017/2018)

Evaluated the effectiveness of beta **Replenish™** products on the growth of canola and HRS wheat. Soil deficient in P (4 ppm P<sub>1</sub>) and S (3 ppm SO<sub>4</sub>-S) was utilized (Cooking Lake series) with five treatments replicated three times. All other significant nutrients (N, P, B) were balanced.

Treatment Parameters	Details	Wheat Yield (g/pot)	Wheat Yield % Increase	Canola Yield (g/pot)
Check	P and S Deficient Soil	2.43		0.03
Rock P	200 ppm P <sub>2</sub> O <sub>5</sub>	3.61	49	0.08
11-52-0	50 ppm P <sub>2</sub> O <sub>5</sub>	3.42	41	0.06
Replenish 70:30 blend (70% RP, 21% ES, 9% PAC)	200 ppm P <sub>2</sub> O <sub>5</sub> , 60 ppm S	4.21	73	5.46
Replenish 80:20 granules (70% RP, 14% ES, 16% PAC)	200 ppm P <sub>2</sub> O <sub>5</sub> , 35 ppm S	3.91	61	7.22

Wheat showed highest yields with the **Replenish™** treatments.

### Nutrient Removal

Crop nutrient removal contributes to substantial nutrient loss over one growing season. Continuous soil nutrient depletion will reach a critical point where quality and ultimately crop yield diminish without a nutrient replacement program.

Crop	Nutrient Removal			
	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	S
Peas (30 Bushels)	100	26	82	10
Winter Wheat (50 Bushels)	93	32	74	12
Canola (30 Bushels)	82	39	76	21
Barley (60 Bushels)	83	34	91	11

Application of **Replenish™** on an annual basis can help replace P and S removed by the crop while building soil nutrients to acceptable levels for optimum plant growth.

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