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The Right Form of Phosphorus Fertilizer will Improve Your Yields

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Apart from nitrogen, potassium and phosphorous are the two most mobile major nutrients essential for crop production. These nutrients influence virtually all the biochemical processes and developmental phases of plants. Potassium helps in regulation of water balance while phosphorous keeps the metabolic machinery functional in plants.

Recently farmers in south eastern Alabama, southern Georgia and northern Florida have experienced problems that seem to be related to the use of ammonium phosphite as starter fertilizer instead of Ammonium polyphosphate (Alabama Cooperative Extension System, May, 2004). The difference in phosphorous ionic form lead to the problems encountered by these farmers. As mentioned below phosphite is the fungicidal form of phosphorous that is not recognised by roots for uptake and metabolism compared to the most acceptable form called phosphate. Although, phosphite can get oxidised by soil microbes to phosphates , but most recent research has shown that phosphite reduced the root and shoot growth @ 24 kg/ha (Barrett, 2002). McDonald et al., 2001 found that phosphite is not utilized, but may trick phosphorus deficient plants into not mimicking typical P deficiencies. Wells et al., (2000) found that toxicity symptoms in alfalfa disappeared after 21 days. Harris (2003) applied both phosphate and phosphite starter and foliar fertilizers on **cotton** to compare its growth response to different P sources, and found that phosphite treated plants were shorter compared to phosphate treated plants

(Fig. 1). Phosphite injury to corn in Southeast Alabama 2004

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The typical symptoms of phosphite injury to plants closely mimic glyphosate damage (Fig. 2), an amino acid inhibitor herbicide. Glyphosate contains a terminal phosphite group that imparts herbicidal property to the glyphosate molecule.

Armed with this latest knowledge ,Spraygro Liquid Fertilizers' product chemist Dr Deepak Mathur has developed the worlds highest liquid PK formulation 'PICK 20-40' . This formulation has an NPK ratio of 0:20:40 w/v and contains the most recognisable forms of potassium and phosphorous ions for efficient uptake, distribution, growth and productivity.
PICK 20-40 is a non-phosphite phosphorous fertilizer with a near neutral formulation to harvest the best crop.

PICK 20-40 can be conveniently applied through the drippers at early stages of crops and through the leaves (foliar) during the fruiting and later stages of growth to produce the best quality crop with higher yields. .Phosphites should not be used as a substitute for plant – available , orthophosphate forms of phosphorous . Phosphite is not immediately plant available and could lead to plant toxicities in sensitive crops if high rates are applied . Phosphite damage appears amazingly similar to glyphosate injury to crops .

fig 2 - phosphite stunted corn (L) compared to normal corn

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Metabolic functions of Phosphorous

Phosphorous provides the energy to cells to multiply and grow. The phosphate ion present in the fertilizers get attached with adenosine moity to synthesize adenosine triphosphate (ATP), the energy currency of cells. Another biomolecule synthesised by the photosynthetic tissue contains phosphate ion, called reduced nicotinamide adenine dinucleotide phosphate (NADPH) that drives the fixation of carbon dioxide to form starch. Phosphorous impoverished plants exhibit characteristic deficiency symptoms including

- purple (anthocyanin pigment) colouration of leaves and petioles
- purple and weak stems
- enhanced root growth at the cost of shoot development
- increased root to shoot ratio
- low yields

The ability of plants to acquire phosphate-P during deficiency conditions also increases due to the synthesis of phosphate transporters. These biomolecules also transport phosphite ions. Phosphite is rapidly absorbed and translocated within the plant. However, the uptake is pH dependent and subject to competition by phosphate ions. Phosphite in presence of a small quantity of phosphate will not be recognised by phosphate transporters. Despite having similar mobility, the phosphite is a non-metabolized form of phosphorous and plants cannot use this as the sole source of phosphorous. Phosphate can be assimilated into organic P compounds within minutes of uptake.

Potassium

Potassium is a highly mobile nutrient and must be incorporated in any nutritional program. Traditionally, potassium is often ignored in the crop production system, as a result the growers are now experiencing potassium deficiency in their farm. Potassium must be applied early in the season for root uptake or through the foliage only at later stages of growth, as roots do not absorb potassium generally after flowering. Crops such as cotton and potatoes have high potassium requirements due to the substantial leaf area

development. Potassium regulates the opening and closing of stomata, the site of gas exchange for photosynthesis and water loss through transpiration. Potassium is also a component of some enzymes actively participate in photosynthetic reactions. Foliar application of potassium especially during fruit development period promotes fruit size, aroma and carbohydrate synthesis. The deficiency symptoms of potassium include

- Marginal and leaf tip necrosis due to the enhanced synthesis of polyamines
- Poor quality fruit and fruit size
- Late season blotchy chlorosis

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- Poorly developed root system
- Plants wilt easily with imposition of marginal water stress

For further information contact SPRAYGRO LIQUID FERTILIZERS ph 08-84477266, www.spraygro.com.au

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