Non-Confidential Description - PSU No. 1269
“Solid-Phase P Buffer for Sustained, Low-Leaching P Fertilization of Container Plants”

Keywords:
- Smart fertilizer, phosphorus fertilization

Links:
- US Patent - 5,693,119
- US Patent - 6,287,357
- US Patent - 7,485,171
- Inventor Website

Inventors:
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Background
A major problem associated with container plant production is the relatively large amount of fertilizer that must be applied and leached from the pot to insure adequate plant nutrition without excessive salt buildup. The leached fertilizer, especially N and P, is an environmental contaminant that causes water pollution. At recommended rates of fertilization and leaching, greenhouse production adds an estimated one (1) billion kg of P contamination to U. S. water resources each year. State and federal regulatory agencies are contemplating restrictions on fertilizer effluent that will increase demand for more efficient fertilization technologies. An associated problem with fertilization of container plants is the difficulty of adjusting nutrient availability to plant needs as the plants grow and are subjected to diverse environmental conditions, especially in the hands of homeowners with little horticultural expertise.

Invention Description
Researchers at The Pennsylvania State University have developed a novel solution to this problem through the use of solid-phase chemical buffers that provide a stable supply of P to plant roots over time in amounts that are dependent on actual plant need. When loaded with P through special processing, the product becomes a solid-phase P buffer that establishes an equilibrium with solution-phase P at the desired set point (determined by the loading conditions). As plant roots acquire P from the solution, the buffer will replace the absorbed P to maintain equilibrium, thereby providing a buffered supply of P to the roots that is regulated by actual plant requirement and uptake. The regulation of P release into solution by plant P uptake reduces P leaching from the pot by more closely matching P supply and demand. This system also assures the plant a continual supply of P without the need for supplemental P fertilization over extended periods. Any added P from fertilizer or irrigation solution would bind to the input material and enter into the exchange equilibrium established. The potting media could be sold with the P-loaded solid already mixed in, so that the media would come with its own P fertilization system incorporated.

Advantages/Applications
- Uses commercially available materials
- Proven successful laboratory testing
- Better growth and crop quality
- Reduction of phosphorus runoff
- Improved drought tolerance