

Annual Phosphorus Loss Estimator (APLE) Model Sensitivity Analysis

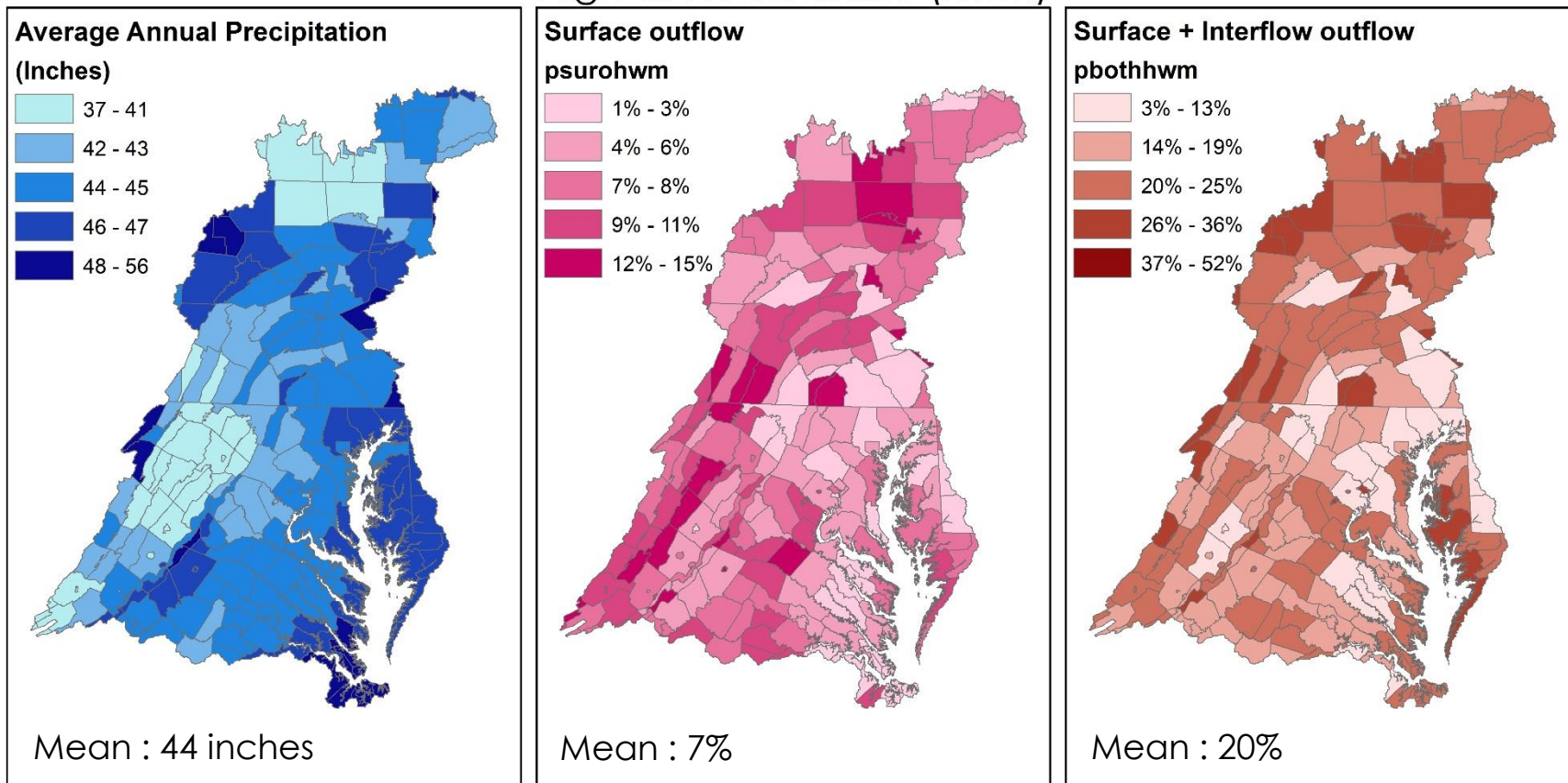
Guido Yactayo - UMCES

04-02-15

Objectives

- To implement APLE 2.4 in our suite of models
- To estimate APLE model sensitivity to change in phosphorus inputs in the Chesapeake Bay Watershed
- To decide Phase 6-PQUAL phosphorus sensitivities

Mean Percentage of Rainfall Resulting in Runoff (1984-2005) - High-till with manure (hwm)

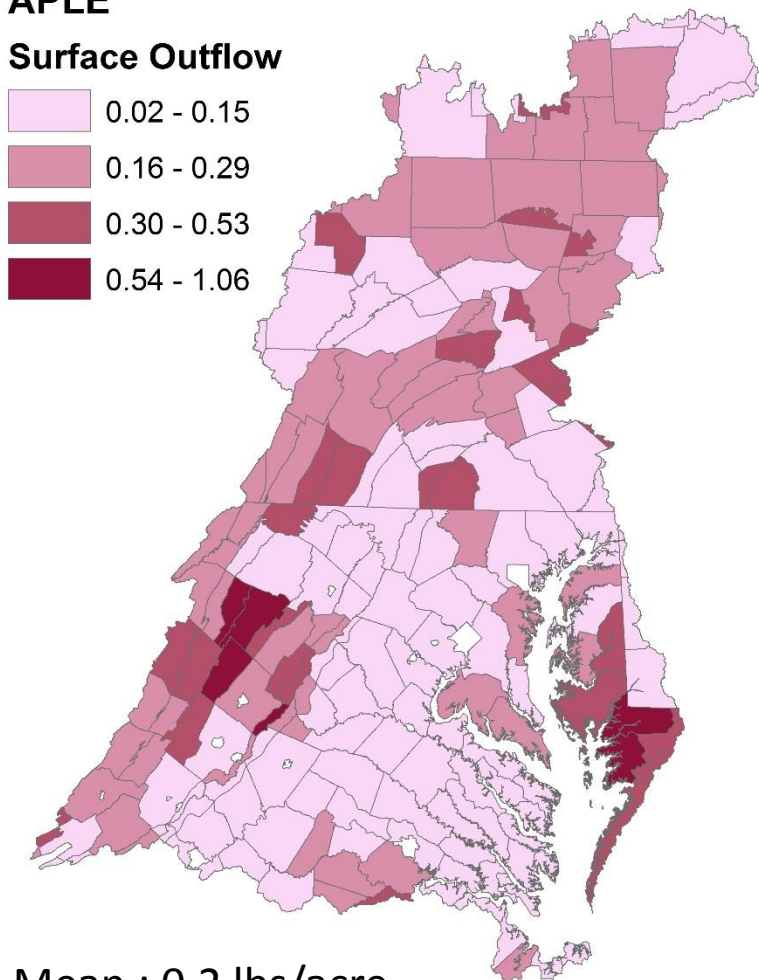
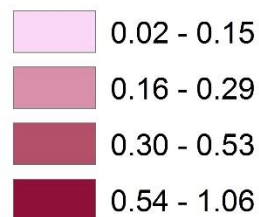


According to Vadas (2013), for poorly drained soils, annual runoff may be 30-40% of total annual precipitation. For well drained soils, annual runoff may be only 5-10% of annual precipitation.

APLE Total Dissolved Phosphorus - High-till with manure (hwm) Edge of Field (lbs/acre)

APLE

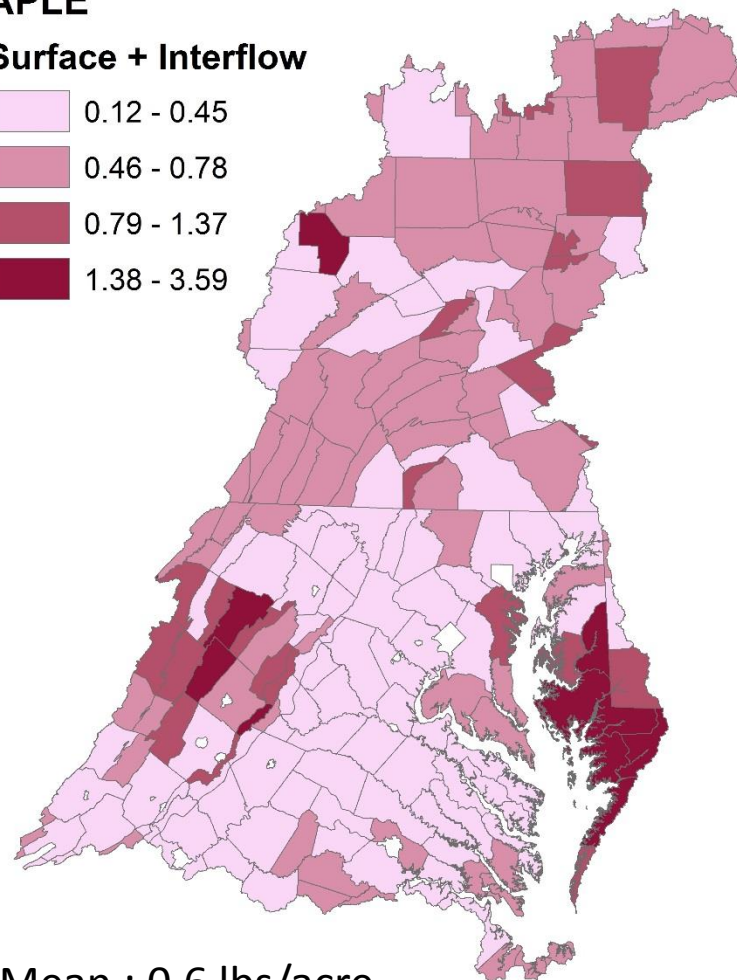
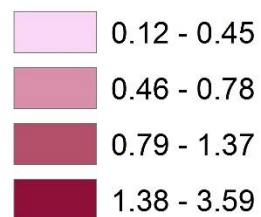
Surface Outflow



Mean : 0.2 lbs/acre

APLE

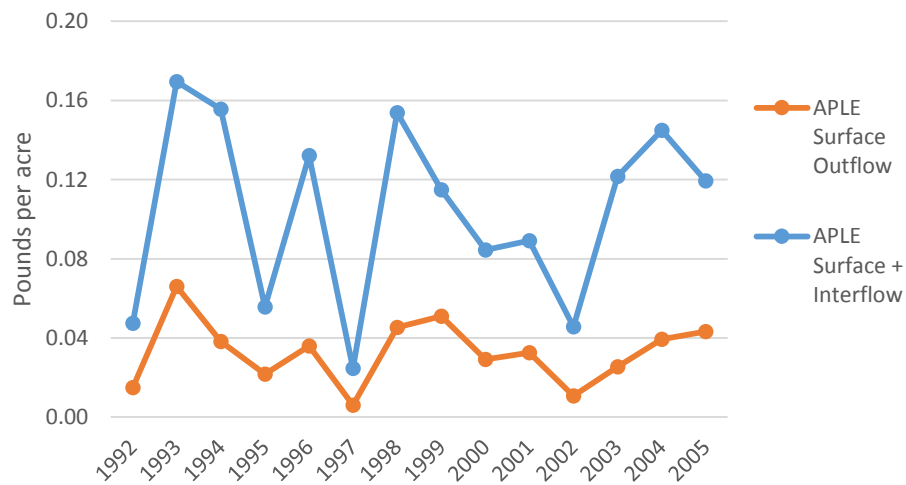
Surface + Interflow



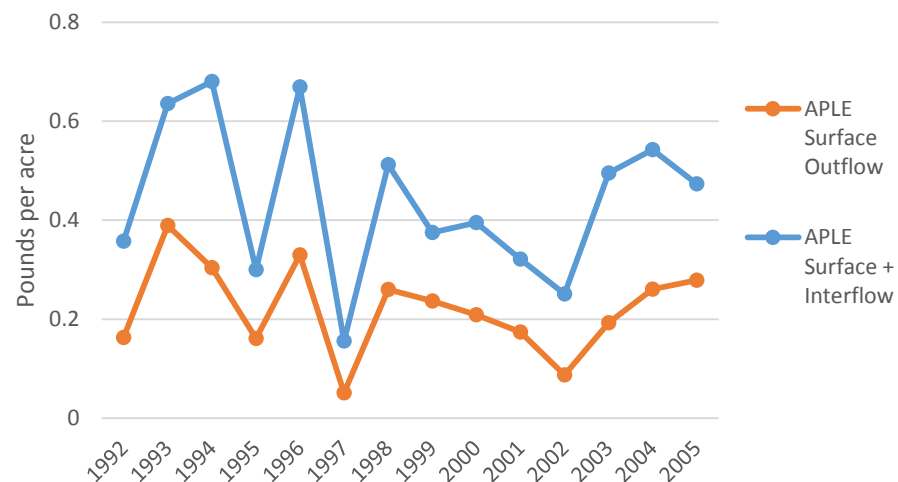
Mean : 0.6 lbs/acre

Bradford PA – high till with manure

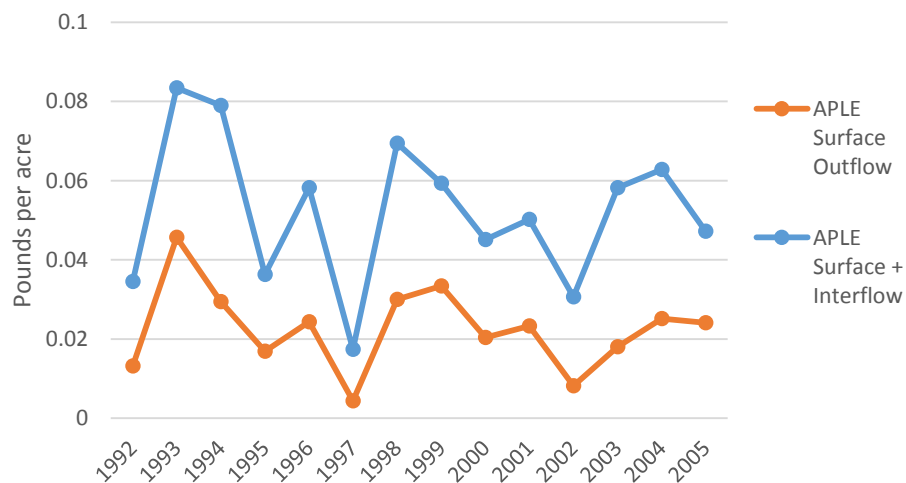
Fertilizer Dissolved P



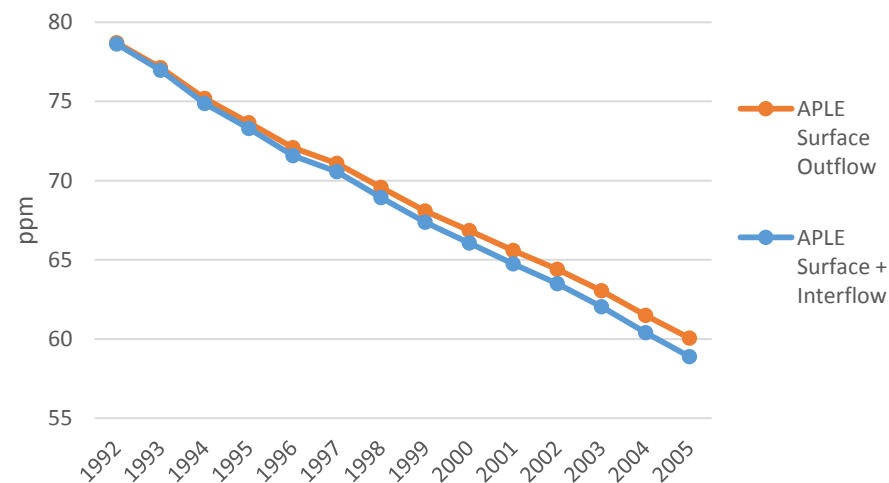
Soil Dissolved P



Manure Dissolved P



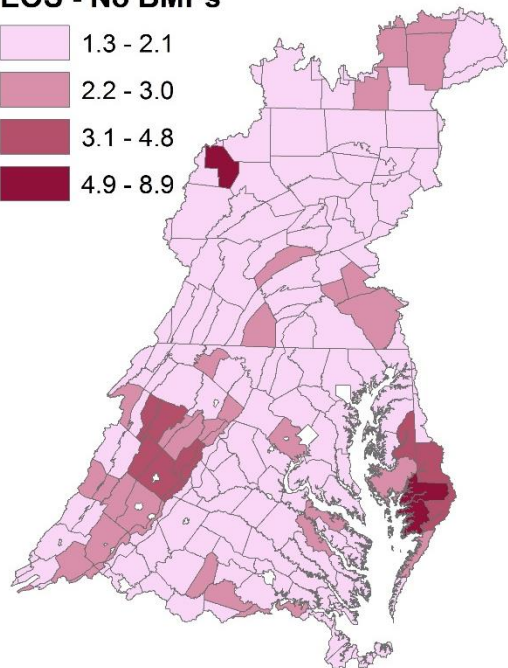
MEHLICH P



Total Phosphorus Export - High-till with manure (lbs/acre)

P5.3.2

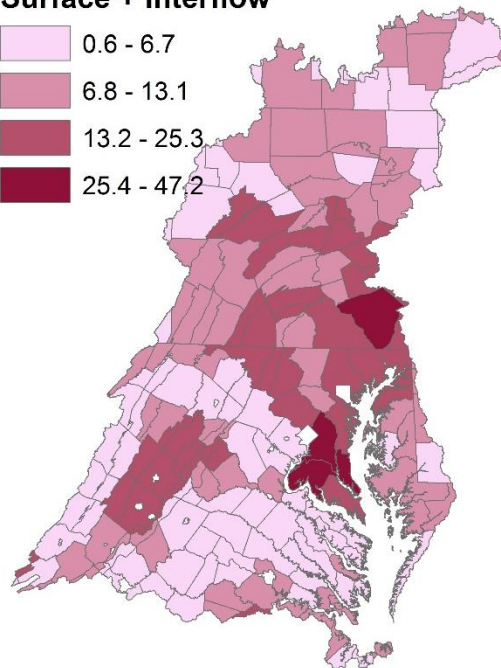
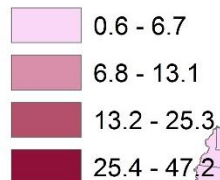
EOS - No BMPs



Mean : 2.1 lbs/acre

APLE

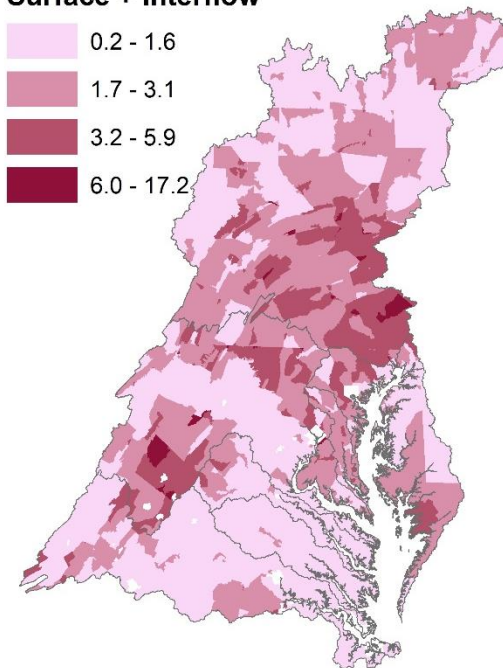
Surface + Interflow



Mean : 9.4 lbs/acre

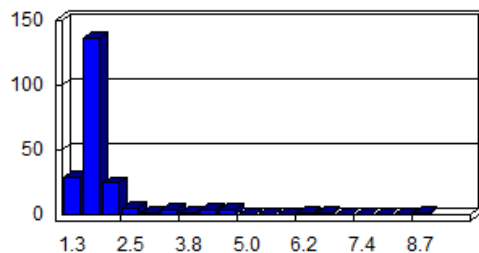
APLE + Transport Factors

Surface + Interflow

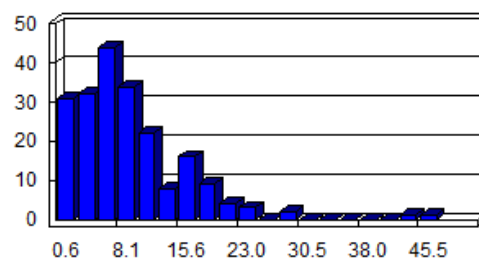


Mean : 2.0 lbs/acre

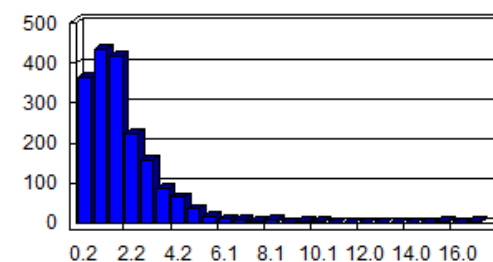
Frequency Distribution



Frequency Distribution



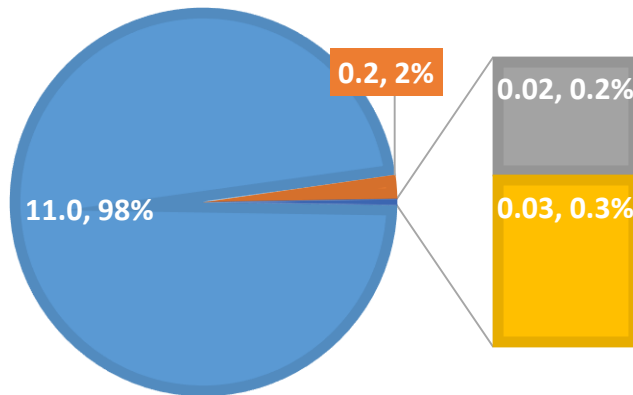
Frequency Distribution



Bradford PA – high till with manure

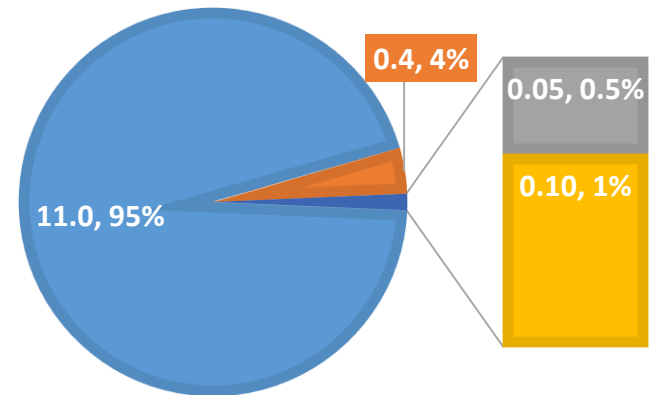
APPLE WITH SURFACE OUTFLOW

■ SEDIMENT P LOSS ■ SOIL DISS P ■ MANURE DISS P ■ FERTILIZER DISS P



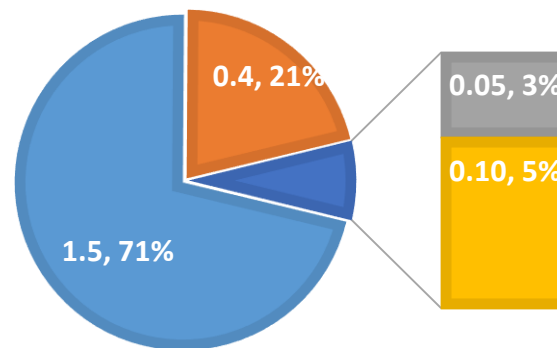
APPLE WITH SURFACE + INTERFLOW

■ SEDIMENT P LOSS ■ SOIL DISS P ■ MANURE DISS P ■ FERTILIZER DISS P



APPLE WITH SURFACE + INTERFLOW + TRANSPORT FACTORS

■ SEDIMENT P LOSS ■ SOIL DISS P ■ MANURE DISS P ■ FERTILIZER DISS P



APLE Model Sensitivity due to Change in Inputs

- Base scenario 1992-2005
- High till with manure, low till and pasture
- Fertilizer, Manure, Crop Uptake, ... (?)
- -60% -30% 0% +30% +60% (4)
- SEDPLOSS, SOLDISSP, MANDISSP, FERDISSP, TOTPLOSS (5)
- All land segments (~300)

APLE Model Sensitivity due to Change in Fertilizer Input

