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# Annual Phosphorus Loss Estimator

*APLE is a spreadsheet model that simulates dissolved and sediment bound phosphorus loss in surface runoff.*



**Click here** to download  
spreadsheet for

- Data Entry
- Output Graphs

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Excel spreadsheet model that estimates (lb/ac) annual, field-scale, dissolved and sediment P loss in surface runoff for given set of management, soil P, erosion, runoff conditions.

Intended to be process-based like SWAT, APEX, but user-friendly like P Index.



# APLE Inputs

Fill-In Values			
	Category	Units	
<b>Soil Properties</b>	Depth to Bottom of 1st layer	inches	1
	Depth to Bottom of 2nd layer	inches	6
	Mehlich 3 Soil P 1st Layer	ppm	25
	Mehlich 3 Soil P 2nd Layer	ppm	25
	Soil Clay 1st layer	%	20
	Soil Clay 2nd layer	%	20
	Soil OM 1st Layer	%	1.9
	Soil OM 2nd Layer	%	1.9
	Field Area	Acres	1.00
		Year	
<b>Transport Factors</b>	Annual Rain	inches	38.00
	Annual Runoff	inches	6.00
	Sediment Loss	ton/acre	1.50
<b>Annual Crop P</b>	Crop P Export	lb/ac	25.0

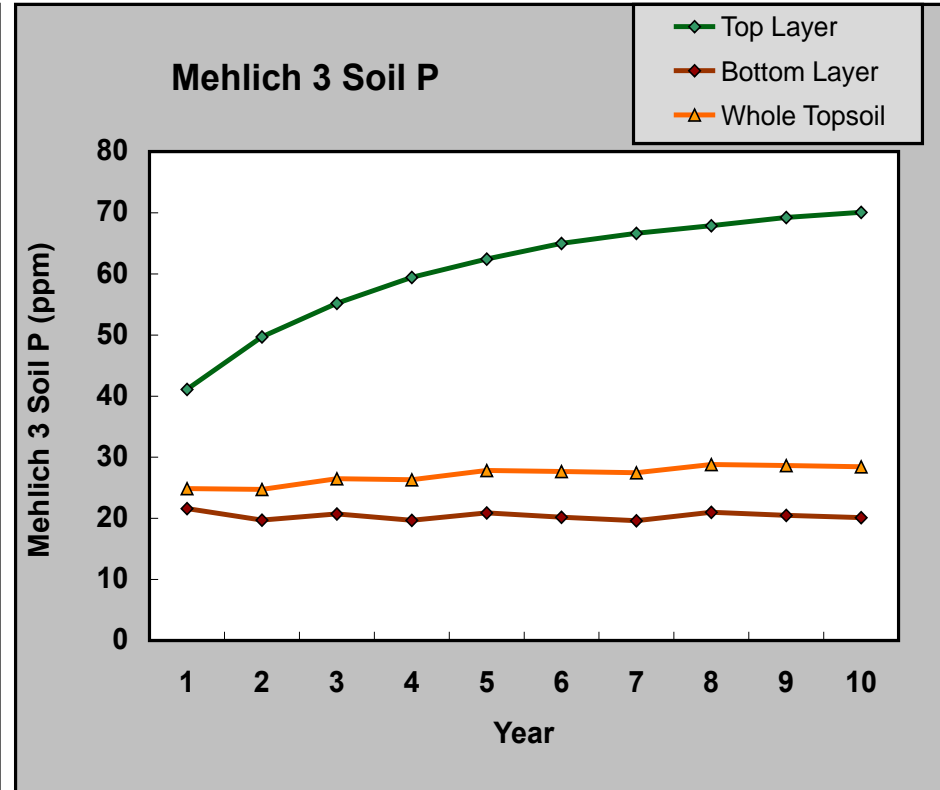
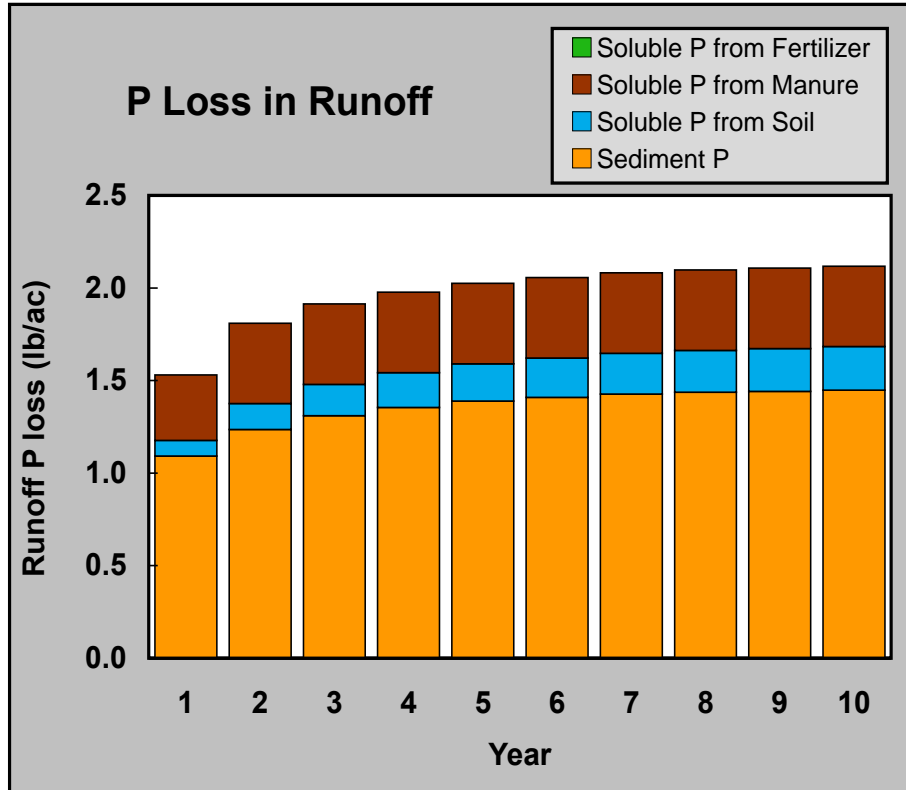


# APLE Inputs

			Milk Cows	Heifers	Dry Cows	Calves
		<u>Grazing Animals</u>				
	Total Cow Days (# cows x # days)		0	0	0	0
			Beef Cows	Calves		
			0	0		
		<u>Solid Manure Applications</u>	Winter	Spring	Summer	Fall
Manure Applications	Manure Applied	wet ton/acre	0	0	0	0
	Manure Solids	%	0	0	0	0
	Manure Total P2O5 Content	lbs/wet ton	0	0	0	0
	Manure WEP/TP	%	0	0	0	0
	Manure Incorporated	%	0	0	0	0
	Depth of Incorporation	inches	0	0	0	0
		<u>Liquid Manure Applications</u>	Winter	Spring	Summer	Fall
Manure Applications	Manure Applied	gallons/acre	0	5000	0	5000
	Manure Solids	%	0	6	0	6
	Manure Total P2O5 Content	lbs/1000 gal.	0	6.1	0	6.1
	Manure WEP/TP	%	0	50	0	50
	Manure Incorporated	%	0	0	0	0
	Depth of Incorporation	inches	0	0	0	0
		<u>Fertilizer Applications</u>				
Fertilizer Application	Fertilizer P Applied	lb/ac	0			
	Fertilizer Incorporated	%	0			
	Depth of Incorporation	inches	0			
	Degree of Soil Mixing	%	15			



# APPLE Output

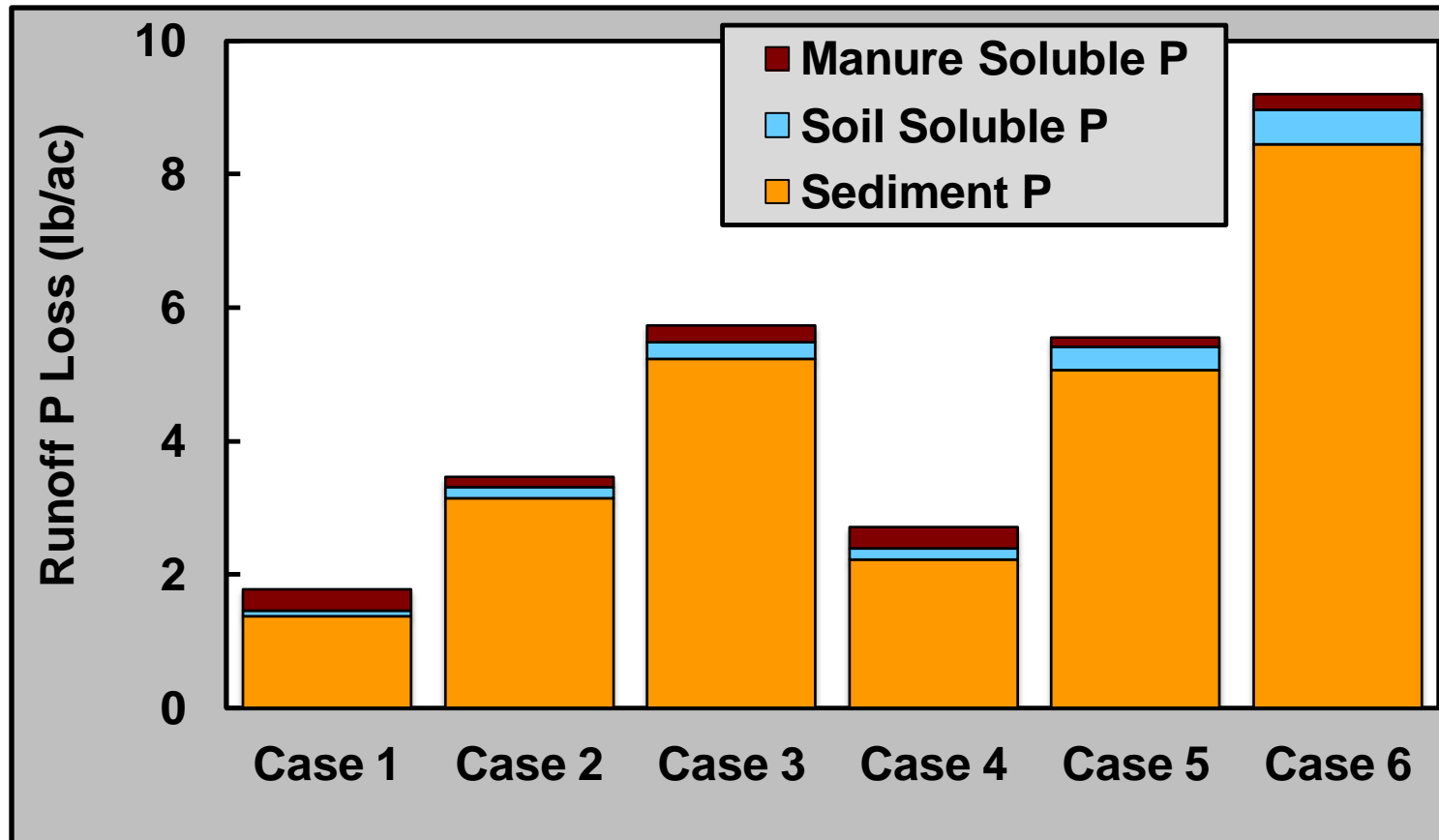




# APLE Testing

- ❑ *P loss in runoff* - Measured data from 28 crop studies from 13 states, Australia, Ireland (Vadas et al., JEQ 2009), 14 grazing studies from 5 states, Australia, New Zealand (unpublished)
- ❑ *Soil P dynamics* - Measured data from 19 studies monitoring changes in soil P from 1 to 25 years (Vadas et al., JEQ 2012)
- ❑ Current updates include P loss from barnyards and feedlots, uncertainty estimates

# Keeping P Loss Low



**Case 1: 50 STP, 1 ton/ac erosion, 3 in runoff, 45 lb P/ac liquid on surface**

**Case 2: 50 STP, 3 ton/ac erosion, 6 in runoff, 45 lb P/ac liquid tilled**

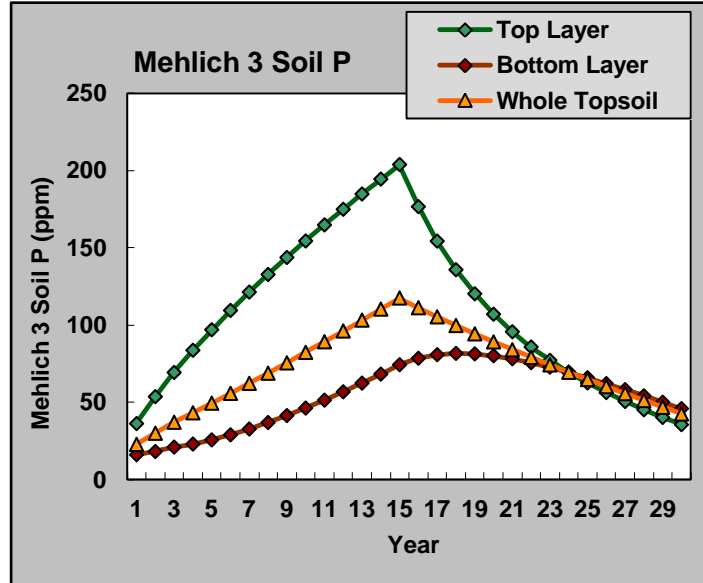
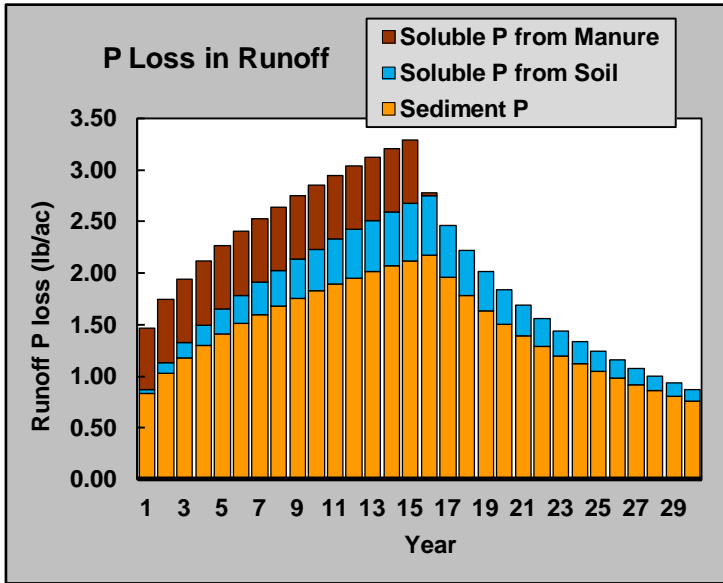
**Case 3: 50 STP, 5 ton/ac erosion, 9 in runoff, 45 lb P/ac liquid tilled**

**Case 4: 100 STP, 1 ton/ac erosion, 3 in runoff, 45 lb P/ac liquid on surface**

**Case 5: 100 STP, 3 ton/ac erosion, 6 in runoff, 45 lb P/ac liquid tilled**

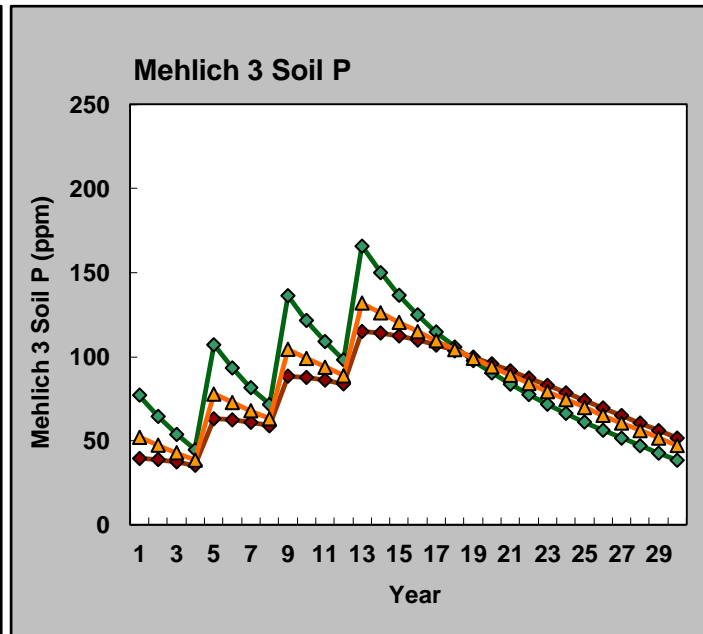
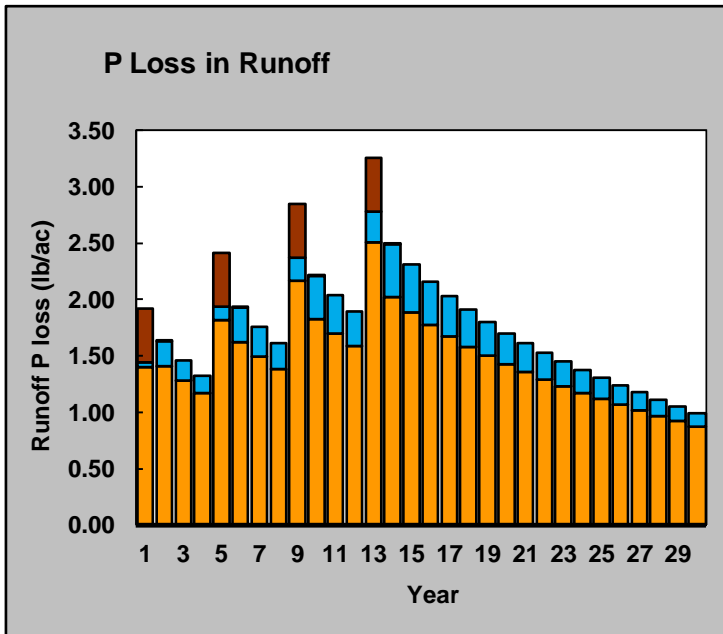
**Case 6: 100 STP, 5 ton/ac erosion, 9 in runoff, 45 lb P/ac liquid tilled**

# Soil P Buildup and Decline



**1.5 ton/ac  
erosion  
5 in runoff  
45 lb P/ac**

**No-till**



**Manure  
applied (180 lb  
P/ac) and  
tilled once  
every 4 years**