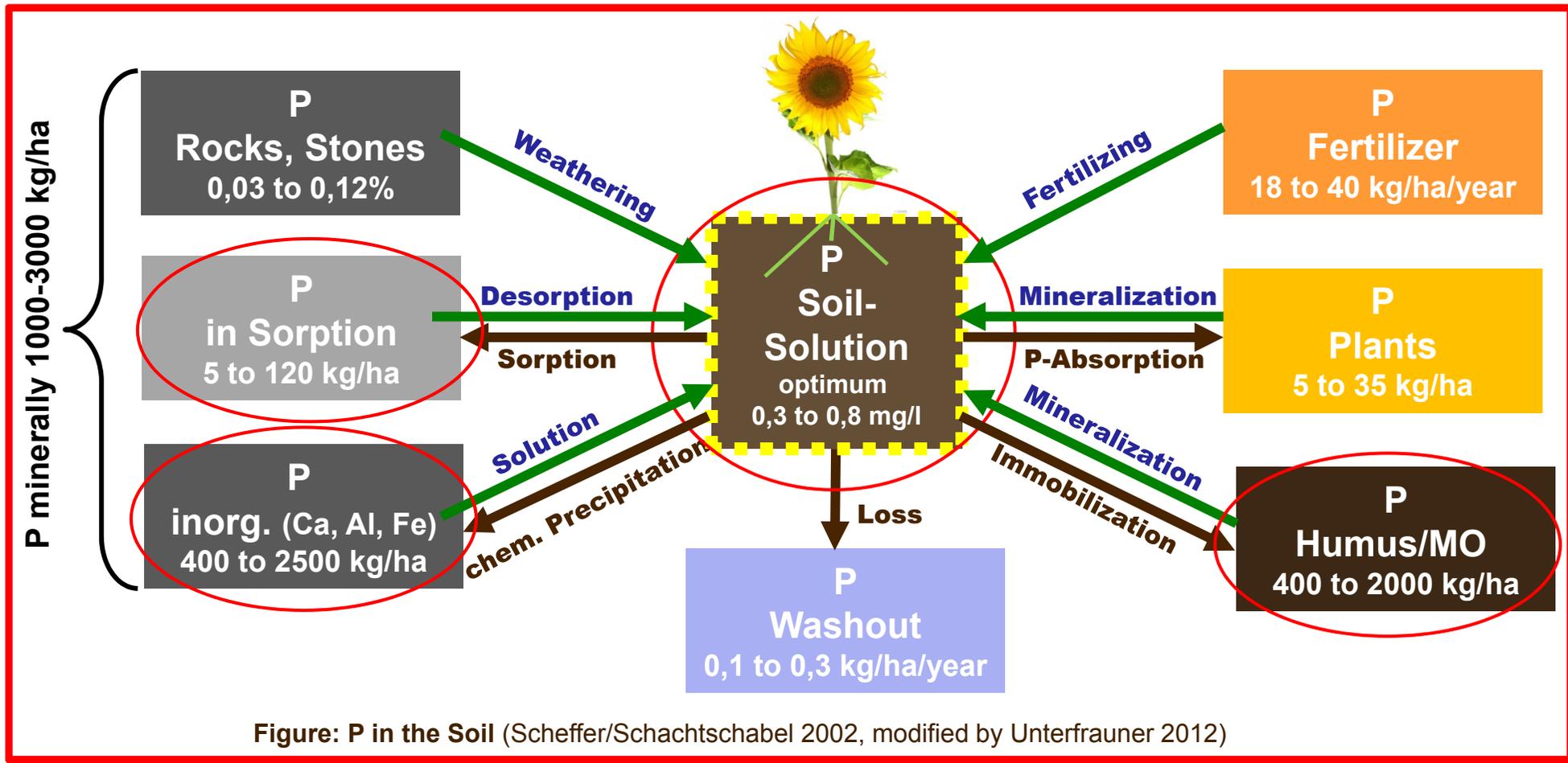


Phosphorus in the Soil

Data sheet worked out by TB Unterfrauner (2012)



○ P-Pool analyzed by TB Unterfrauner

P x 3,067 = PO ₄	P x 2,291 = P ₂ O ₅	PO ₄ x 0,747 = P ₂ O ₅
PO ₄ x 0,326 = P	P ₂ O ₅ x 0,436 = P	P ₂ O ₅ x 1,334 = PO ₄

Phosphorus Pool

P Soil Solution (optimum 0,3 to 0,8 mg/l = 1,5 to 2,5 kg/ha):
Plant absorbs P only in soluble form out of the soil solution.

P Fertilizer minerally / organically (18 to 40 kg/ha/year):
Concentration in the soil solution is rising. Momentary surplus can fix Zn, Fe, Mn, Cu. Quick immobilization (Triphosphate = P_{inorg}).

P Plants (removal 5 to 35 kg/ha): Plant roots absorb, withdraw P, concentration in the soil solution declines. Plant residues are mineralized, P released, concentration in the soil solution is rising.

P Humus (400 to 2000 kg/ha), **P Microorganisms** (60 to 120 kg/ha):
20 to 75% of P_{total} are there in organic binding forms, a part of that can be transformed into plant available forms.

P in Sorption (5 to 120 kg/ha): the anion phosphate (PO_4) can adhere exchangeable to oxides and hydroxides in the soil.

P inorganic (400 to 2500kg/ha):
Is a huge P-sink. P from different sources (e.g. fertilizers) is converted into stable Ca-, Fe-, and Al-phosphates, depending on the pH-value. P also can be "absorbed" or „occluded“ by mineral parts.

P Rocks, Stones (0,03 to 0,12%): The starting material for soil formation can contain P-rich minerals. The natural processes of soil formation and weathering convert stable P into a soluble binding form.

P total Contents (1500 to 3000 kg/ha): From 1950 to 2000 much more P has been fertilized than needed by the plants, around 1100kg/ha (Köster and Nieder, 2007).

Mobilization/Remark:

from pH 6,5 to 7,5 P exists in a form that's favourable for plants.

Organic fertilizers contain P in the form of phytin, which has to be further processed by microorganisms to become plant available P.

Withdrawal numbers are often too high.

- ✓ encourage biological activity
- ✓ feeding benthic organisms
- ✓ optimize air / water conditions
- ✓ add trace elements if needed (e.g. Mo)
- ✓ P bacteria

✓ competing ions (e.g. silicic acid)

- ✓ optimize pH-value (6,5 to 7,2)
- ✓ cultivate P-processing plants (e.g. buckwheat, white lupine)
- ✓ cultivate catch crops

- ✓ using acidic acting fertilizers
- ✓ encourage benthic organisms

analyse P-pools, use and mobilize reserves, instead of fertilizing P!