Soil sampling made easier

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The new rotary blade soil sampler has taken the hard work out of collecting soil samples from Western Australia's hard-setting soils to test for soil phosphorus levels.

Conceived and developed by Department of Agriculture technical officer Mike Baker, it should enable soil testing to be more widely adopted. Fortunately, the soil calibration tests that were developed using pogo samples can also be used for the new sampler.

How the rotary blade sampler works

The new rotary blade soil sampler – the leading edges of the blade are lined with tungsten – can be driven by a tractor PTO, or it can be powered with its own motor and pulled by a vehicle.

The rotating blade is lowered into the soil and collects a soil sample by cutting a slot about 2 cm wide and 10 cm deep (the depth can be adjusted) in the soil. The length of each cut can be varied, but 1 m or 2 m long slots were used for our study. The new sampler collects a larger amount of soil than the pogo sampler, a one-metre slot being equivalent to about 400 pogo samples.

Pogo samplers are 2.5 cm diameter by 10 cm long metal tubes that are pushed into the soil by foot to collect a soil sample. It is extremely difficult to push the pogos the full 10 cm in hard-setting dry soils, and frequently, soil samples were collected that were shallower than 10 cm. Also, too few soil samples were usually collected because it was difficult to do so.

This has led to possible errors in estimating the current phosphorus status of soils. It has also prevented the widespread adoption of soil testing as an aid to providing fertiliser recommendations and monitoring soils for possible deficiency.

The new machine collects and pulverises the samples in a box attached to the sampler, from which a 1 g subsample is taken to measure soil test phosphorus. The pogo samples comprise many hard cores, which must be crushed and mixed by hand before a subsample can be taken.

The rotary blade sampler can take several samples by lowering and raising the blades into the soil while traversing a paddock. The new machine should be able to soil sample a whole farm in a day, whereas it could take a week to use the pogo sampler.

The new sampler successfully penetrated and collected soil samples from all the dry, hard-setting soils we sampled. They included hard-setting sandy loams (for example Wongan sandy loams from near Wongan Hills, or Eradu sandplain soils east of Geraldton), loams (the red soils at Avondale or Chapman), and clays (red-brown clays near Merredin, the Kumarl soils near Salmon Gums, and the clay moort soils near Jerramungup).
We also sampled the lateritic ironstone gravel soils in the Darling Ranges near North Bannister and West Dale, with more than 60 per cent of the soil comprising gravel stones greater than 2 mm in diameter.

Within the errors associated with soil testing, soil test phosphorus values were similar for subsamples of soil collected with either the rotary blade sampler or with the pogo sampler. The same soil test calibration developed using pogo samplers can also be used for the new sampler.

The Department of Agriculture has applied for a patent for the rotary blade soil sampler. It hopes that a local manufacturer will produce the machine and that farmer groups or land conservation district committees would buy a machine for their use.