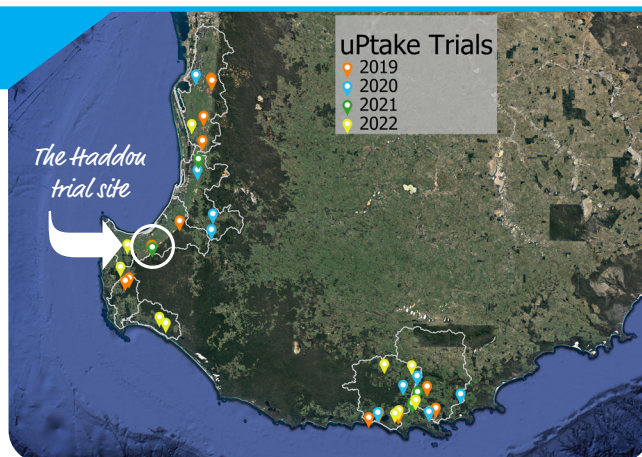


uPtake case study: Geographe catchment

The McNab trial



Andrew McNab



Measurements at the McNab site

The award-winning uPtake project has increased farmer and industry confidence in the science behind phosphorus fertiliser recommendations by validating national critical soil test values for phosphorus (P) for south-west Western Australia (WA).

Andrew and Roseanne McNab's coastal plain farm, situated 30 kilometres east of Augusta, is a family owned and managed property. As beef and sheep farmers who depend on consistently productive pastures, the trials offered valuable insights into the interaction and retention of phosphorus in their soil.

"We were eager to participate in the uPtake trials to explore how we could improve our nutrient practices to maximize the productivity of our pastures." – Andrew McNab

The McNab trial was undertaken over four years, from 2019 to 2022.



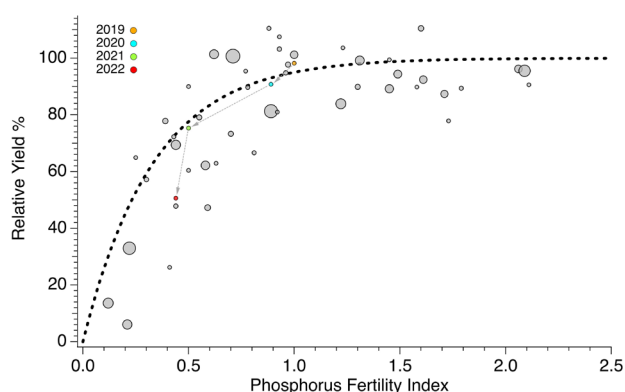
McNab site



McNab trial site in 2022

Site characteristics

	2019	2020	2021	2022
Phosphorus buffering index (PBI)	1.0	1.5	3.2	1.8
P fertility index	1.00	0.89	0.50	0.44



The graph left, plots the relative yield achieved when 0kg/ha of phosphorus plus basal nutrients were applied on each of the 50 uptake trial sites during four of the trial years (2019 -2022).

The coloured dots show the relative yield achieved at the McNab trial site during the 2019, 2020, 2021 and 2022 trial years.

The size of each dot in the chart relates to the phosphorus buffering index (PBI) of each site. The bigger the dot the higher the PBI of the trial site. Soils with a high PBI have a greater ability to adsorb and retain phosphorus. Soils with a very low PBI have a poor ability to adsorb phosphorus and are prone to leaching. The McNab site had a very low-range soil PBI of 1.8. In Australia soil PBI's typically range from 1-1000.

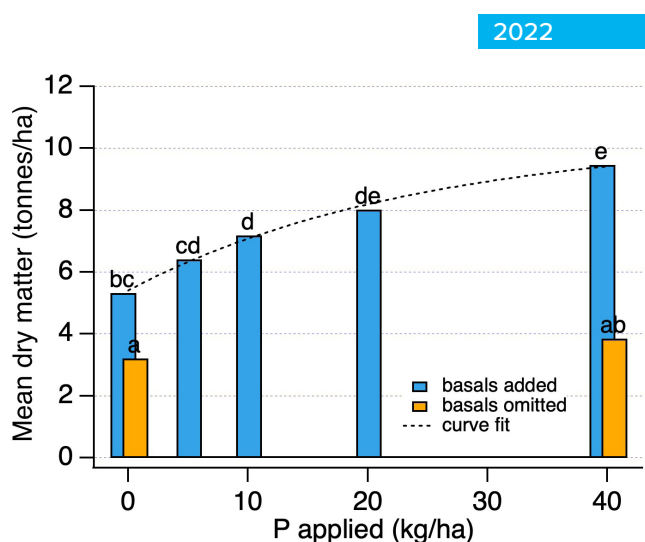
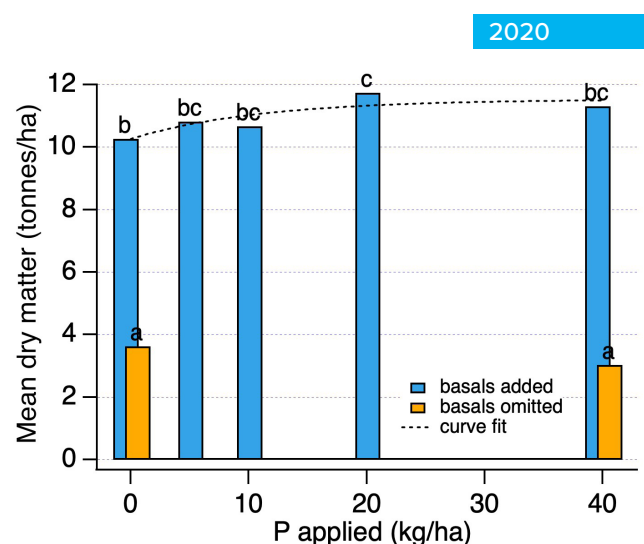
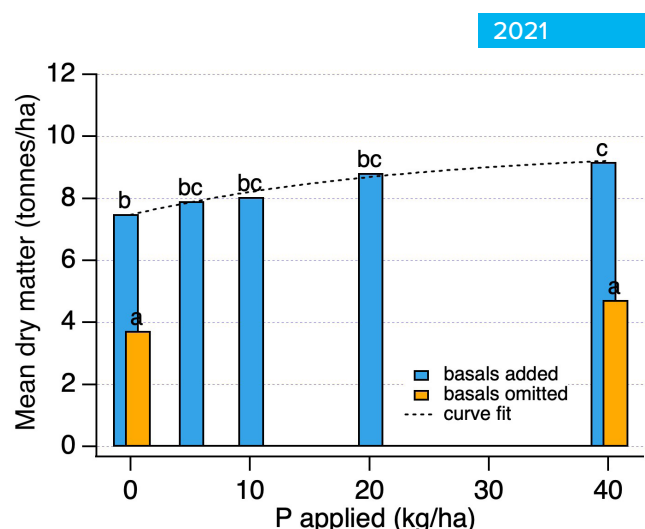
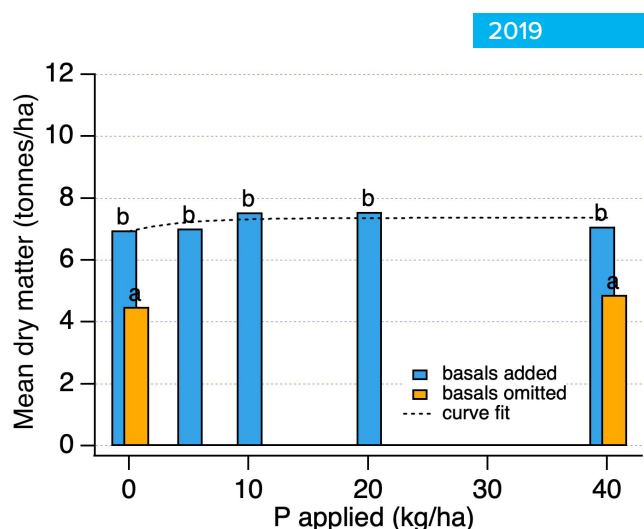


For additional detail on the uPtake trials and explanations of technical terms, scan the QR code to view the uPtake Trail Summary 2019–23.

Key findings

Consistent with other uPtake trials, this site showed significant responses to basal nutrients (nitrogen, potassium, sulphur). The application of basal nutrients more than doubled pasture biomass, whether phosphorus was applied or not. Seasonal factors (rainfall, temperature, day length) impacted the total amounts of pasture biomass grown in different years.

Four years of measurements allowed the rundown of soil P fertility on control plots at this trial to be measured. Starting at a P fertility index of 1.00 in the first year, no response to phosphorus was identified. Significant responses to applied phosphorus were identified in years 3 and 4 as P fertility index reduced to 0.50 and 0.44 respectively. These findings are consistent with the notion that application of phosphorus is only required when P fertility index is less than 1.



Note: Treatments with the same letter are not significantly different



McNab site

Key learnings

Application of phosphorus to soils with a P fertility index greater than or equal to 1 will not result in increased pasture biomass. The money saved from not applying phosphorus can be redirected to other nutrient constraints such as nitrogen, potassium and sulphur, dramatically increasing pasture biomass and farmer profits, while reducing the risk that phosphorus will be lost offsite. Running this type of trial over multiple years provides valuable information on the rate of change in soil phosphorus fertility.

Under a normal beef and sheep grazing scenario with removal rates of 1-2 kg P/ha/yr, and without knowledge of leaching losses, it is estimated that with no P inputs it would take around 20 years for the P fertility index to rundown to 0.44 because the P removal rate is much lower than what occurred in the trial (7-18 kg P/ha/yr). The uPtake trials accelerated the rate of nutrient removal from soil because pasture biomass was measured and removed from the site during each 4-6 week period of the pasture growing season.



Taking samples at the McNab site

More information

These trials were among 52 trials established over four years across south-west WA. Together, the results from the trials validated that national critical soil test values for P are relevant to south-west WA soils and contemporary pasture species.

Learn more at estuaries.dwer.wa.gov.au/uptake