

There's yet more gold in them thar "hills"!

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Potato growers in New Zealand should be regularly achieving yields of 80 t/ha or more with their spring-planted crops. In fact, the average is still only around 60 t/ha.

The Potato Calculator (another fine example of Kiwi ingenuity) has given valuable insight in helping us to understand better how a potato crop ticks, and for the first time has revealed the potential yields that are out there.

At \$200-400/tonne, an extra 20 t/ha means growers could be getting at least another \$4000-8000 per hectare!

In the 5 years of Sustainable Farming Fund and HortNZ-funded work so far, centred around improving nitrogen management as a way of lifting potato yields, a persistent theme has emerged. In the majority of potato crops, focussing only on nitrogen supply has not been the key to boosting yields well past the 80 t/ha mark.

It's true that in some cases there have been small yield improvements when extra nitrogen has been applied after planting (Figure 1). Extra nitrogen applied as a side dressing ranged from 0-120 kg N/ha in these crops. But the improvements have mostly occurred where we know the crops had limited access to resources beyond 30-40cm of the soil profile - for example, crops 1, 3 and 4, or where the soil was naturally shallow - Crop 6.

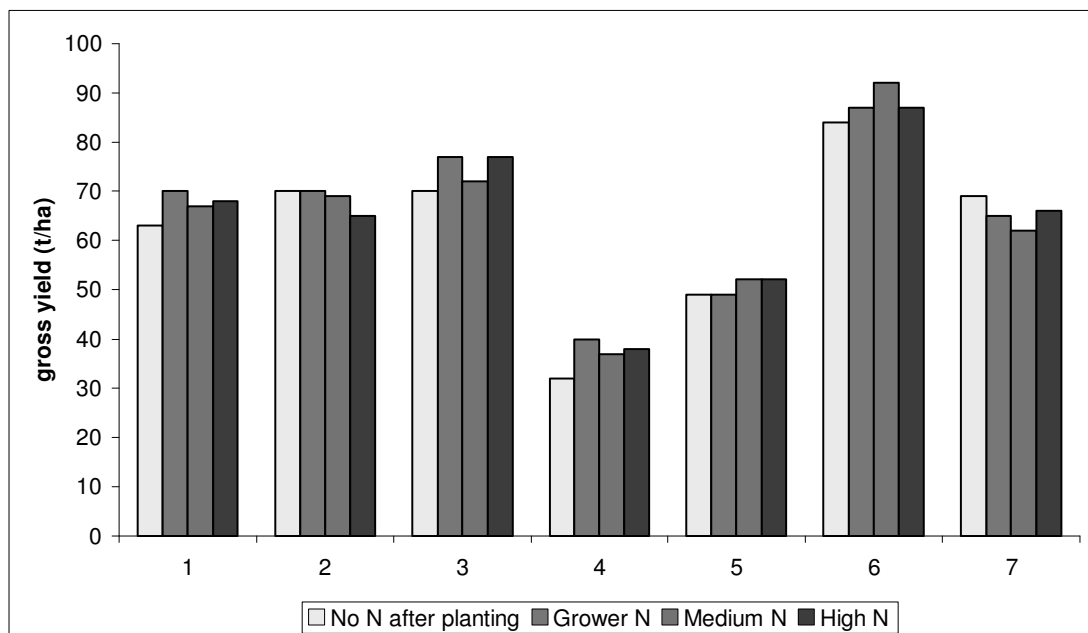


Figure 1. Gross yields from 4 side-dressing rates in North Island crops monitored in the 2006-07 season. Crops 1-3 were in Waikato, crops 4 and 5 in Manawatu, and crops 6 and 7 in Hawke's Bay.

The biggest limitations to yield in these monitored crops in the 2006-07 season have proved to be:

Lack of water in 7 of the 8 crops monitored (Table 1). Crops 6 and 7 were the only ones irrigated, and only crop 6 received enough water (Table 1). Water supply is even more critical in crops that rely purely on rainfall, and growers are not taking advantage of the water reservoir beneath their very own crops. How come? This can be directly linked to the next limitation:

Poor soil physical properties which prevented wimpy potato roots from penetrating to a depth where they could access more water and nutrients. Soil compaction, whether a natural feature of a particular soil type, or man-made, is a largely unseen problem. It has so far been underrated, because no one has been able to measure the cost until now.

Delayed planting. Crops 1, 2, 3 and 6 were planted in October/early November, having a clear advantage over crops 4, 5 and 7, which were planted in late November/mid December. This factor is not always within grower control, but it should be noted that each month's delay in planting through spring can cost up to 25 t/ha of yield. Putting more nitrogen on will not compensate for this loss.

Lost yield t/ha

| Site | Yield | PC Potential | Difference | Comments |
|------|-------|--------------|------------|---------------|
| 1 | 67 | 85 | 18 | Lack of water |
| 2 | 68 | 86 | 18 | Lack of water |
| 3 | 74 | 85 | 11 | Lack of water |
| 4 | 37 | 58 | 21 | Lack of water |
| 5 | 50 | 78 | 28 | Lack of water |
| 6 | 88 | 89 | 1 | Enough water! |
| 7 | 65 | 82 | 17 | Lack of water |

Table 1. Measured gross yield, and potential yield calculated by the Potato Calculator, using real weather. The figures in red are the estimated yield losses, largely caused by lack of water.

Getting to know your soils better will be a first step towards remedying some of these limitations to yield. A comprehensive profile study, while time-consuming perhaps, only needs to be “a oncer” for each paddock, as any soil changes will be slow to take place. If soil restrictions are identified, either a soil improvement programme can be formulated, for example introducing new cultivation techniques, or the grower will need to learn how to adjust to those limitations. This may take the form of, say,

reviewing irrigation scheduling to help minimise water stress in a shallow-rooted crop.

Although this is quite a change of emphasis for our SFF project, the team has made allowances in the third year for an extra study of each demonstration crop's soil profile, and this will take place at the end of November 2007. Parameters measured will be soil texture, penetrometer resistance, soil moisture, bulk density, drained upper (field capacity) and lower (wilting point) limits, and amounts of carbon and nitrogen in the top 30cm (to calculate mineralisation rates).

If there is further grower interest when this project ends mid 2008, then our intention will be to propose a new initiative in the direction of learning how to overcome soil limitations in potatoes and other important crops such as wheat, maize (the Wheat and Maize Calculators are already developed) peas, and perhaps pastures.

For a copies of the annual reports to come from these SFF projects, please contact Ron Gall at ron.g@hortnz.co.nz