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Nitrogen inputs in potato

In Indonesia, potatoes tend to be grown with a great deal of nitrogen. Data from potato farmers showed that the total average nitrogen input was 400 kg/ha: 180 kg/ha from chemical fertilisers and 215 kg/ha from 22 tonnes of manure per hectare. The associated costs were almost 13 million Indonesian rupiah per hectare for the application of chemical fertilisers and 13 million per hectare for manure. Such high inputs result in considerable costs for farmers (around 20% of production costs) and are potentially harmful to the environment.

Experiments on nitrogen fertilisation

Trials with nitrogen fertiliser in the dry and wet seasons of 2014 and 2015 identified possibilities to reduce nitrogen inputs and related costs. Experiments in the wet season included plastic mulch to reduce weeding. These trials in Garut Regency and the district of Pangalengan showed farmers the effects of using different amounts of chemical fertilisers and manure. Farmers were frequently invited to observe the fields and share opinions on the performance of the Atlantic and Granola potato varieties.



Results

In the nitrogen trials, each hectare yielded approximately 30 tonnes of potatoes when 15 tonnes of manure and 120 kg of nitrogen or more (via chemical fertilisers) were applied per hectare.

These results indicate that reductions in nitrogen and manure inputs are possible without compromising yields. Reducing nitrogen inputs also reduces costs linked to fertilisers, manure and labour, and improves the resource use efficiency of inputs. We also learned that farmers had limited knowledge of the nutrient content of the products used and little awareness of the amounts of nutrients applied with manure.

Highlights

- Farmers in Indonesia use approximately 22 tonnes of manure per hectare in potato cultivation, which corresponds to around 322 kg of nitrogen per hectare.
- On average, farmers supplement 249 kg of nitrogen per hectare in addition to that applied through manure.
- Experiments showed that manure applications can be reduced by 10 to 15 tonnes/hectare without reducing yields.
- Lower fertiliser and manure inputs can reduce fertiliser costs by approximately 10%.

Final results

A reduction of 10 tonnes/hectare of manure saves farmers around three million rupiah per hectare in product costs. Less manure also means lower transport and labour costs. Savings related to reduced chemical inputs are smaller: 50 kg less nitrogen per hectare saves farmers around two million rupiah on product costs. Combining the results of data from farmers and experiments, we estimate that costs for fertilisation and manure application can be reduced by around 10% (five to seven million rupiah per hectare) through improved nitrogen management, without any risk of yield reduction.

Options for improvement

- The nitrogen content in manure varies considerably between products and is unknown to farmers. Awareness of nitrogen content will enable farmers to better adapt nitrogen inputs to crop demand.
- Some farmers use plastic mulch, which is very likely to affect nitrogen dynamics. More insight into the nitrogen dynamics of potato with and without plastic mulch is needed to formulate improved nitrogen advice for farmers.
- Most farmers apply all fertilisers as a basal dressing (chemical and manure). Split nitrogen application of chemical fertiliser increases nitrogen use efficiency and thus reduces application rates. This technique should be further developed and introduced to farmers.

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