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# NITROGEN USE EFFICIENCY AS AN INDICATOR FOR MONITORING THE ENVIRONMENTAL SUSTAINABILITY OF MAIZE PRODUCTION IN CENTRAL CHILE



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In Chile maize covered 120,000 ha (20% of the total annual crop surface) with a mean yield of 13 ton ha<sup>-1</sup>

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SPRING-SUMMER (MAIZE)



AUTUMN-WINTER (FALLOW)



Small farmers (< 15 ha) applied high N fertilisation rates between 350 and 560 kg N ha<sup>-1</sup>

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# OBJECTIVE

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- ❑ The main purpose of this study was to evaluate the Nitrogen Use Efficiency (NUE) as an indicator for monitoring the environmental sustainability of maize production in the O'Higgins Region in central Chile.
- ❑ To use the NUE indicator for evaluating the extension services offered for a Clean Agreement Program (CAP) developed for the Chilean Government for the maize-farmers in this Region.



# NITROGEN USE EFFICIENCY (NUE)

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$$(\%) = \frac{\quad}{\quad}$$

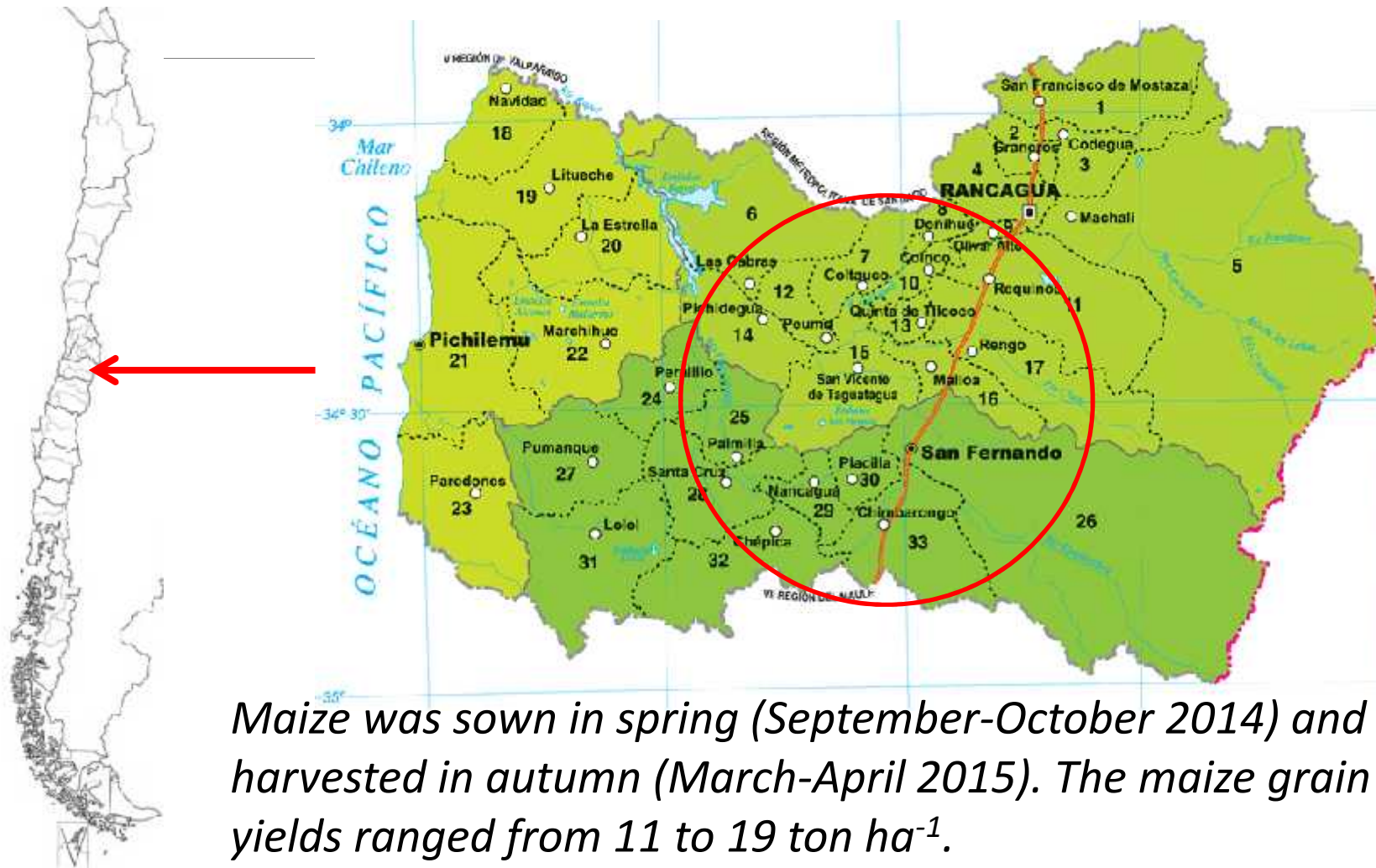
NUE 50% - 90% is the desired.

NUE < 50% indicates an inefficient N uses.

NUE > 90% indicates soil N depletion.



The study was carried out on 80 maize fields located in the O'Higgins Region in central Chile



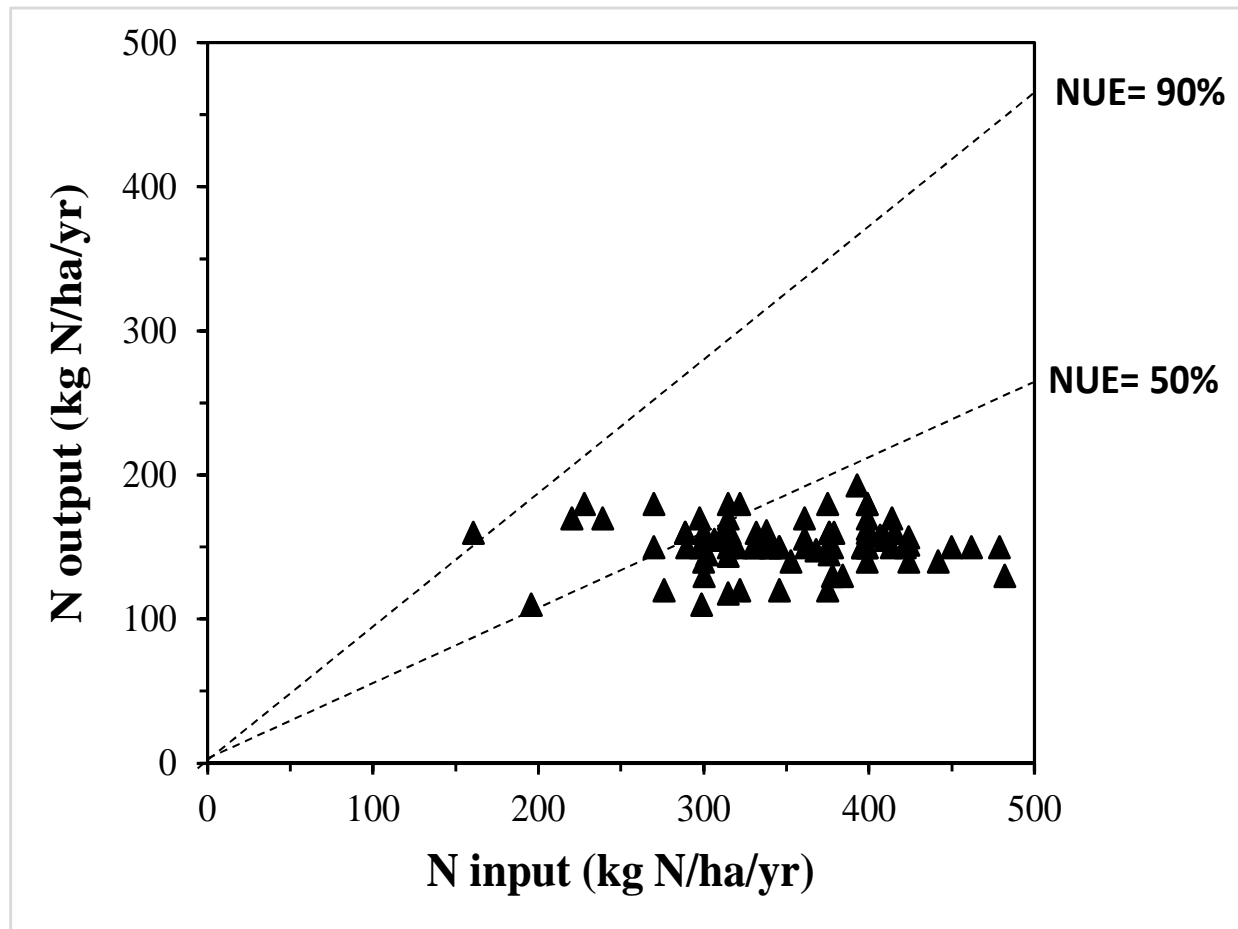
*Maize was sown in spring (September-October 2014) and harvested in autumn (March-April 2015). The maize grain yields ranged from 11 to 19 ton ha<sup>-1</sup>.*

# Clean Agreement Program (CAP)

- ❑ In 2015 these farmers signed up for a voluntary CAP developed by the Chilean Government for the maize-farmers in this Region.
- ❑ One of the objectives of the CAP was to increase the NUE and to reduce N pollution.
- ❑ An extension service was developed for calculation of optimum dose of N fertiliser on each field (N balance)

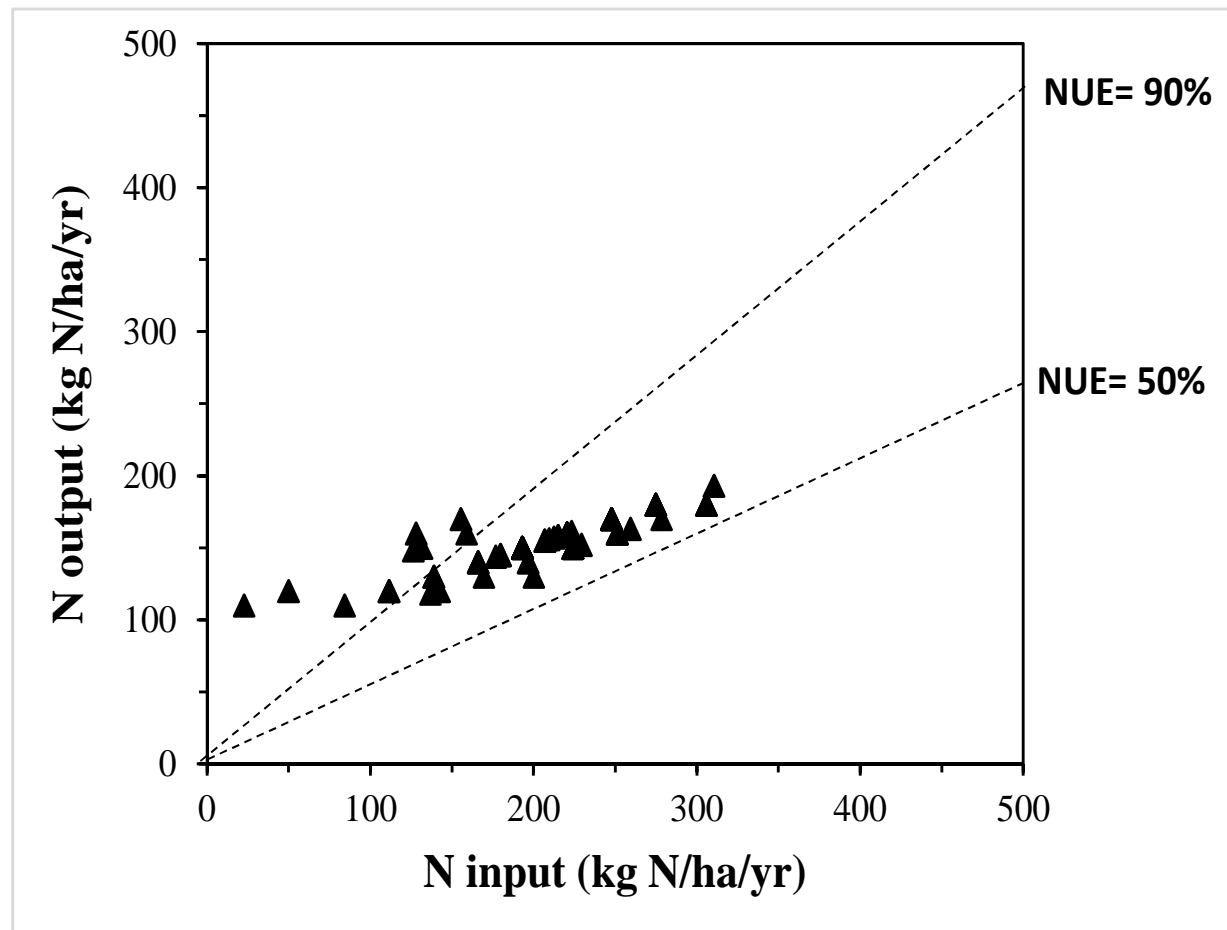


NUE results for maize fields in the O'Higgins Region during the season 2014-2015 (n=80).





NUE results using a scenario of the recommended rate of nitrogen fertiliser by the extension service for the season 2016-2017 (n=80).



# CONCLUSIONS

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- ❑ Most of the NUE values were less than 50% using traditional farmer N fertilisation rates. That implies an over-fertilisation with N and suggests that maize fields are an important source of non-point N pollution.
- ❑ Thus NUE showed that it is necessary to reduce the N input for improving the environmental sustainability of maize production in the O'Higgins Region in central Chile.
- ❑ Most of the NUE values would be between 50% and 90% if an N recommendation scenario based on a mass N balance proposed by CAP were applied by the maize-farmers.



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