



# Effect of Organic Nitrogen Amendment and Irrigation Regime on Agronomic Performance of

## Two Quinoa (*Chenopodium quinoa* Willd.) Cultivars

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### Introduction

- Quinoa (*Chenopodium quinoa* Willd.) is a native crop of South America. It can be cultivated in wide range of environmental conditions and has a high nutritive value.
- Research has shown that it can thrive in drought as well as irrigated environments. However, yield differs under different irrigation levels. In addition, the application of nitrogen fertilizers also promotes the growth and yield of Quinoa (Gomaa, 2013).
- Quinoa is a potential new crop to the Columbia Basin where the annual rainfall is less than 254 mm/year. Due to drought adaptation characteristics in drought, it has great prospect in this region.

### Objective

- To evaluate the effect of organic nitrogen amendments and irrigation regimes on germination, plant height and biomass of two Quinoa cultivars.

### Materials and Methods

- Location: Irrigated Agriculture Research and Extension Centre (IAREC), Prosser, WA
- Year: 2014 growing season (April- August)
- Cultivars: Cherry Vanilla and Oro de Valle
- Irrigation method: Drip (18" emitter spacing)
- Experiment design: Randomized complete design set in a split plot arrangement with irrigation regimes as main treatment and different rate of nitrogen as the sub treatment with three replication.
- Irrigation treatment:
  - Soils were held at 40%, 80% and 100% of field capacity.
- Nitrogen treatment (Certified organic compost):
  - 0 kg/ha, 25 kg/ha, 50 kg/ha, 75 kg/ha and 100 kg/ha N.
- Data analysis: Minitab 17.2.1, difference in means were assessed using LSD at  $P \leq 0.05$ .

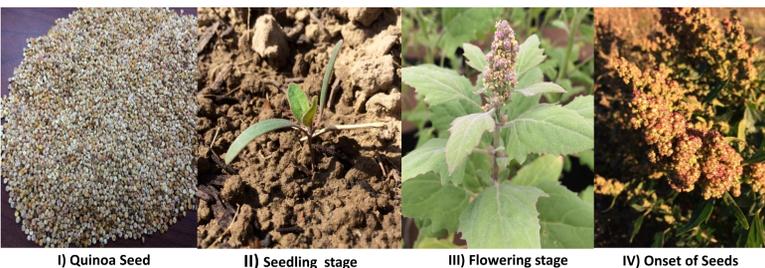


Fig 1: Different growing stages of Quinoa

### Results and Discussion

- Irrigation treatment: Results from 2014 showed significant effect of irrigation treatment on the germination rate in both cultivars (Fig. 2).

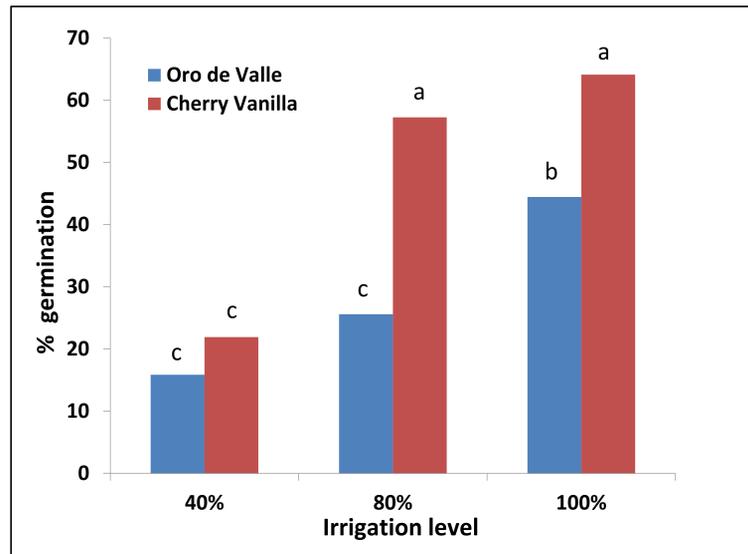


Fig 2: Germination rate of two cultivars of Quinoa at different irrigation rate. Average germination rate with same letter are not significantly different ( $P < 0.05$ ).

- Interaction irrigation and compost: Except in final plant height, no significant interaction effects were observed in either cultivar (Figs. 3 – 6).

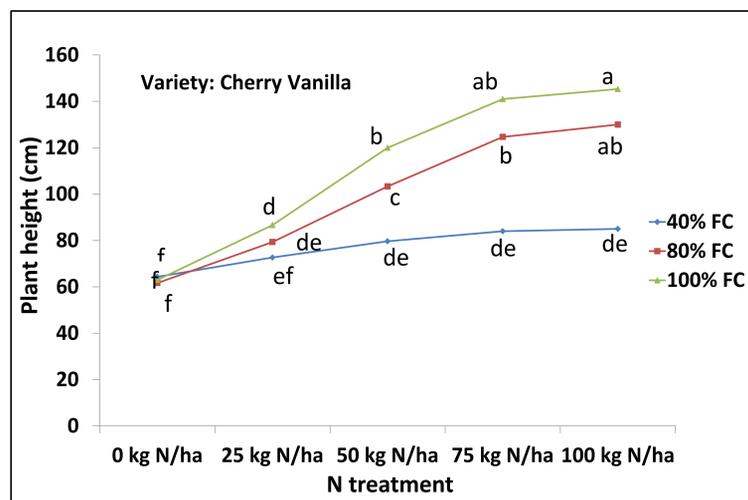


Fig 3: Plant height of Cherry Vanilla at the end of the season. Average plant height with the same letter are not significantly different ( $P < 0.05$ ).

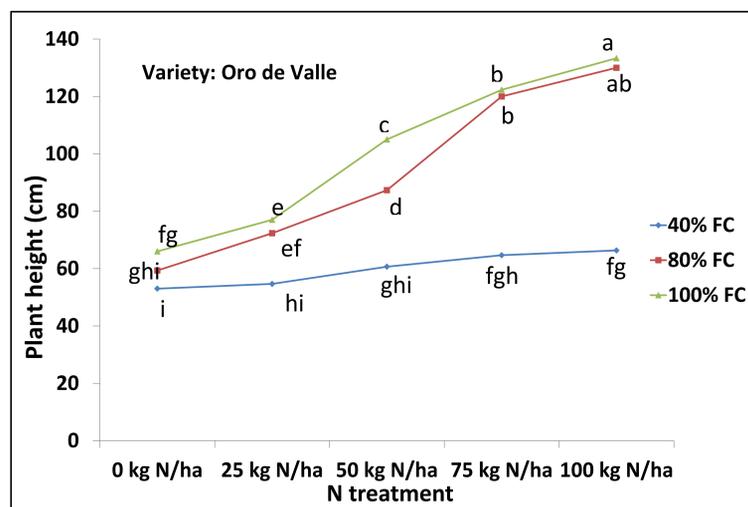


Fig 4: Plant height of Oro de Valle at the end of season. Average plant height with same letter are not significantly different ( $P < 0.05$ ).

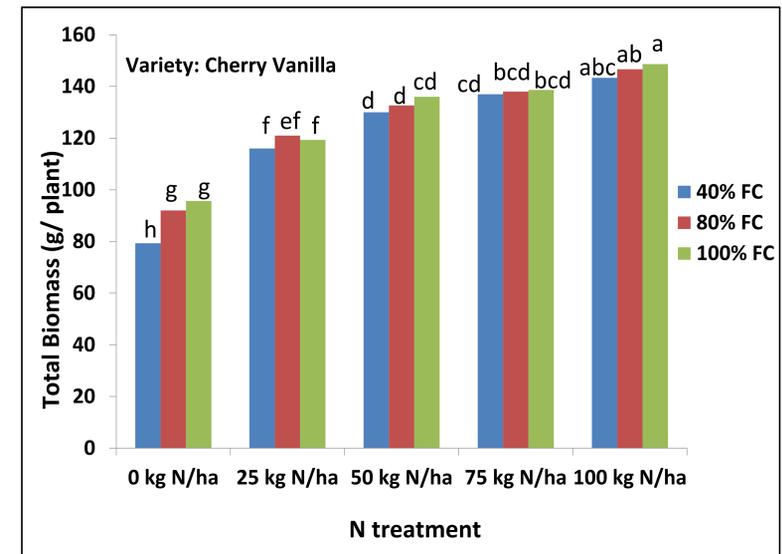


Fig 5: Total biomass per plant of Cherry Vanilla at different compost rate and irrigation regime. The average total biomass with same letter are not significantly different ( $P < 0.05$ ).

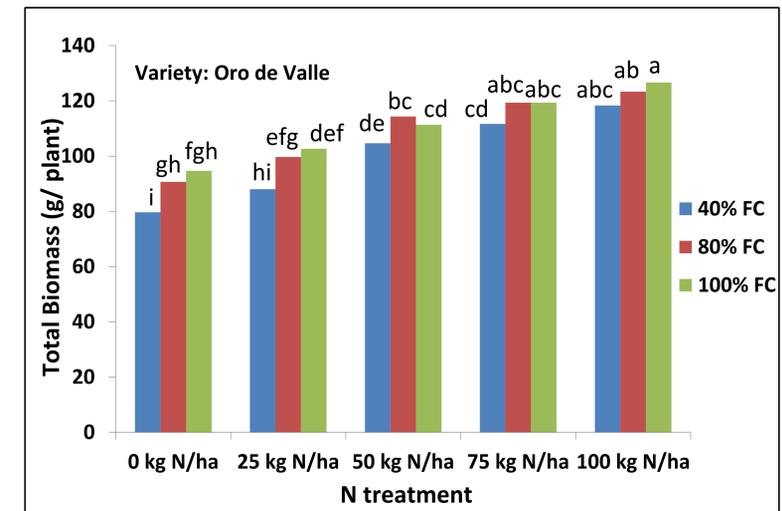


Fig 6: Total biomass per plant of Oro de Valle at different compost rate and irrigation regime. The average total biomass with same letter are not significantly different ( $P < 0.05$ ).

### Conclusion

- Results from 2014 growing season showed that both the compost and irrigation treatments were significantly related to germination, final plant height and the end of season biomass in both cultivars. However, the interaction was between N and irrigation rate was only significant for final height.
- Due to extreme temperatures during the flowering/seed set period in the 2014 growing season there was no seed yield.

### Additional

#### Acknowledgements:

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#### References:

Gomaa, E., 2013. Effect of nitrogen, phosphorus and biofertilizers on quinoa plant. J. Appl. Sci. Res. 9: 5210-5222. ISSN 1819-544X.

