Response of Quinoa to Macro and Micronutrients

Quinoa is considered as a healthy grain and acts as a substitute for rice as a gluten-free alternative. It is finding its way into many products such as pasta and breakfast cereals (www.Quinoa.com). Quinoa is a crop that is best grown around highway 16 and north, from Winnipeg to Edmonton but it is recently getting attention from producers around other parts of Saskatchewan and the prairies as a whole. There is a small acreage grown on the Canadian prairies, especially in Saskatchewan and Manitoba. Approximately 1,600 acres of quinoa is currently grown in Saskatchewan, primarily to supply the Northern Quinoa Company (NQC). Because of the variability in production, NQC still imports product from South America to augment domestic supplies (AARD, 2005).

Quinoa yields range from 300 to 2000 lbs/acre. Anything under 1000 lbs/acre is considered disappointing for conventional producers. In Saskatchewan, the average yield over the past five years (2000-2004) ranged between 750-1250 lbs/ac. Despite the increasing acreages and the potential for higher yields in Saskatchewan and the prairies, there is little research regarding the agronomy of quinoa despite its fertility requirements being similar to canola.

Therefore, a study was conducted at the AAFC Scott Research Farm during the 2016 growing season to demonstrate the response of quinoa to both macro and micronutrients in NW Saskatchewan.

Generally, there were no significant effects of different macro and micronutrients on both plant density and grain yield (Figure 1). The highest application of N (150 lbs/ac), P_2O_5 (30 lbs/ac), K_2O (20 lbs/ac) and S (15 lbs/ac) resulted in the highest plant density of 39 plants/m^2 (Figure 1).

However, the highest plant stands did not translate into the highest yield. This may be attributed to the large standard error of the mean, which suggests a wide range of plant densities produce similar yields. This is consistent with other studies showing no correlation between plant density and yield indicating the compensatory capability of quinoa (Jacobsen et al., 1994).

The highest grain yield relative to the control was recorded in treatments with N (60 or 120 lbs/ac), P_2O_5 (15 or 30 lbs/ac), K_2O (20 lbs/ac) and S (15 lbs/ac).

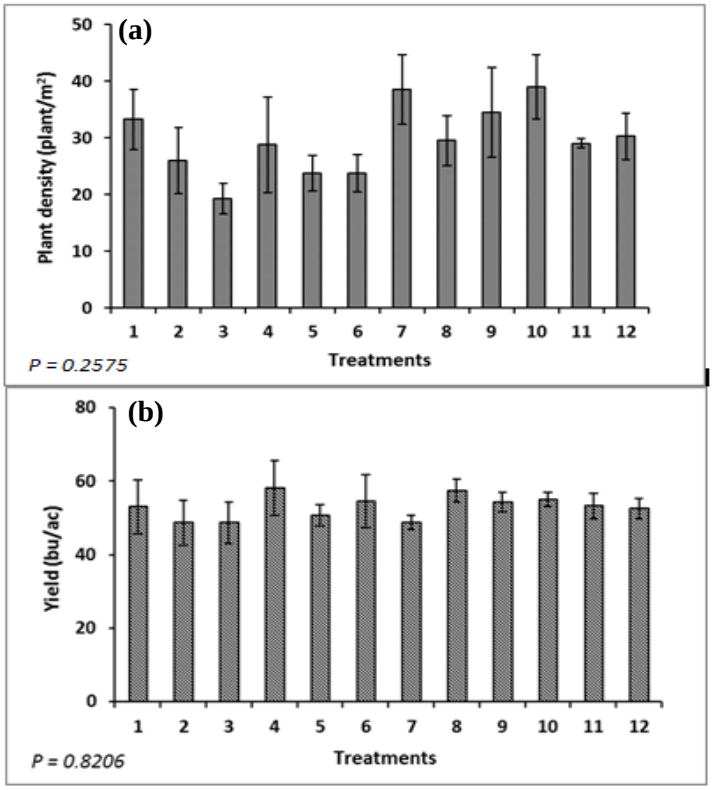

Figure 1: Effects of different macro and micro combinations on plant density (plants/m^2) and grain yield (bu/ac) in quinoa

The application of micronutrients in combination with the macronutrients: N (120 lbs/ac), P_2O_5 (30 lbs/ac), K_2O (20 lbs/ac) and S (15 lbs/ac), did not offer any advantage relative to other treatments on both plant density and grain yield. This may be due to the fact that none of the applied micronutrient had a deficient level from the residual soil test levels.

Results from the study have shown that, quinoa plant stands were lower than the recommended plant population; however, yield was higher than most of reported values around the world and specifically in Saskatchewan and /or the prairies. From the yield obtained, the production of quinoa is feasible under NW Saskatchewan conditions, if appropriate early-maturing cultivars and agronomic practices to control weed and diseases are adapted. Despite the non-significant effects of fertilizer and rates in this study, further work should be carried out to determine the actual fertilizer requirements of quinoa. Full report at: http://www.westernappliedresearch.com/research/warc-annual-reports/2016/. Project was supported by the Agricultural Demonstration of Practices and Technologies (ADOPT) initiative under the Canada-Saskatchewan Growing Forward 2 bi-lateral agreement.