World Academy of Science, Engineering and Technology
International Journal of Biological and Ecological Engineering
Vol:13, No:04, 2019

# Macronutrient Accumulation and Partitioning for Six Wheat Genotypes Grown at Contrasting Nitrogen Supply

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**Abstract :** Partitioning of macro-nutrients in wheat (Triticum aestivum L.) plant organs have not been extensively studied, particularly for modern genotypes grown under contrasting N supply. Nutrient accumulation and partitioning of phosphorus, potassium, calcium, magnesium and sulphur (P, K, Ca, Mg and S) were determined for six wheat genotypes [12S2-2021, 12S3-3019, 13S3-2026, Discovery, Duchess and Reliance] grown with (200 kg/ha) or without (0 kg/ha) nitrogen (N), in a fully irrigated field experiment in 2017-18 season at Lincoln, New Zealand. Data were collected at three growth stages (GS): tillering (GS21), anthesis (GS60) and grain maturity (GS92). Grain yield varied with both N and genotype; from 6-7.5 t/ha for the 0 kg N/ha crops and 8.1-9.3 t/ha for the 200 kg N/ha treatments. Plant nutrient uptake at maturity responded to both N supply and genotype for all nutrients, except S which did not differ among the genotypes. For example, total P uptake averaged 13.5 (12.4-14.3) kg/ha for the 0 kg N/ha treatments and 17.8 (15.1-19.7) kg/ha when 200 kg N/ha was applied. Similarly, K uptake increased from an average of 23 (21.6-25.3) for the 0 kg N/ha treatments to 34.3 (32.4-40.8) kg/ha when 200 kg N/ha was applied. Similar trends were observed for Ca and Mg. The S content only responded to N supply but not to genotype, increasing from 7.9 kg/ha for the 0 kg N treatments to 12.8 kg/ha when 200 kg N was applied. Relative nutrient content at anthesis compared with those at maturity were 30% for P, 100% for both K and Ca and 34% of Mg. Sulphur content at anthesis decreased 29% with N supply and was highest for genotypes 12S2-2021 compared with the other five genotype. At grain maturity, the ratio of nutrients in grain to total plant nutrient, defined as the nutrient harvest index (NHI) varied with both N supply and genotype. Averaged across treatments, the NHI was 0.96 for P, 0.53 for K, 0.58 for Ca, 0.90 for Mg and 0.85 for S. These results suggest that Ca and K should be provided earlier in the season as there is limited or no uptake after anthesis. These results also show that Ca and K are important for structural functions, while P, Mg and S are remobilised to the grains and become important for quality.

**Keywords :** anthesis, genotype, nutrient harvests index, NHI, Triticum aestivum L.
**Conference Title :** ICPSCP 2019 : International Conference on Plant, Soil and Crop Sciences
**Conference Location :** Cape Town, South Africa
**Conference Dates :** April 16-17, 2019