



Grow Safe® Nitrogen Management Trial – Summary of Esperance (2009)

Nitrogen being the major crop nutrient, has attracted attention over the years due to its overly use in the pursuit of increased global food production. Its management has been a matter of concern from the viewpoints of economic sustainability and viability of farm businesses and more so specifically, from the nutrient use efficiency (NUE) and soil health. The crops response to nitrogen depends mainly on its availability, which in turn, is determined by the recycling ability of soil microbes, breaking down the organic matter, mineralizing the immobilized nitrogen and making it available to the plants. The efficiency of nitrogen nutrition is also believed to be dependent on the availability of other minerals including trace elements - their composition, rates and methods of application- and all these factors decide about proper nitrogen management in any crop production system.

With this background, a field trial was conducted in 2009 on a farmer's paddock in Esperance involving an independent research and development service provider (MEAG). The factorial designed experiment had the clear objectives of evaluating the efficacy of Grow Safe® mineral & microbial product (NPK Crop Plus) in comparison to the district's conventional product combination (DAP and liquid N). It comprised of eight treatment plots (150 m x 14 m) that were randomly replicated over three blocks. The proposed trial outcome was to assess the performance of a cereal crop (wheat) – both in terms of its yield and qualities- validating the role of pre-emergent and post-emergent applications of liquid nitrogen (UAN), and that of soil beneficial microbes in plant nutrition. There was also an implicit goal of highlighting the importance of mineral nutrients for crop performance and thus taking the farm nutrition concept beyond just the conventional NPK fertiliser regime.

The farm represented the district's typical sandy gravel soil with low pH (4.7- 4.9), low organic matter levels (1.1-1.3%), poor nutrient availability and higher average annual rainfall (>600 mm). The treatments were designed to address the following objectives of:

- 1) demonstrating the role of UAN, applied via liquid injection at seeding @ 30 l/ha.
- 2) comparing the application of UAN as a foliar post-seeding @ 40 l/ha.
- 3) evaluating the role of microbes (Hort-Blend) coated on the seeds (@600g/tonne) at the seeding time.
- 4) comparing DAP (@70kg/ha) as phosphate source against NPK Crop Plus - AMF's mineral granular fertilizer- (@80kg/ha) applied at seeding, down the tube along with the seed.

Plant growth measurements (Chlorophyll readings) and plant sap analysis were recorded during the critical stages of early tillering, mid tillering and booting. At harvest, the grain yield and quality were measured. Data sets were processed through XLSAT to obtain the analysis of variance (ANOVA) and the least significant differences (LSD) for facilitating the comparison of treatment effects on all the tested parameters.

There was a significant increase in the yield (**32.4%**) and NUE when NPK Crop Plus was used in conjunction with only the microbial seed coating and no additional nitrogen. This was better than the DAP based treatments- with and without additional liquid N. The significant difference in results is reflecting the better utilization of nitrogen when applied in combination with other major and trace minerals available in NPK Crop Plus and the beneficial microbes. The plant sap analytical data also endorsed this finding by having insignificant differences among the nutrient levels in the plant sap in spite of the differential N input levels across all the imposed treatments. The most obvious fact was that the Grow Safe® minerals & microbes outperformed the conventional program in spite of having only half the reported units of N and P, compared to their corresponding nutrient composition in DAP. The additional nitrogen application had a deleterious effect on the performance of Grow Safe® program, suggesting its probable negative impact on beneficial soil microbes.