Dietary Risk Assessment of Residual Pesticides Using LC-MS/MS in Wheatgrass, a High Chlorophyll Content Organic Superfood

Emerging Pollutants and Ground Water

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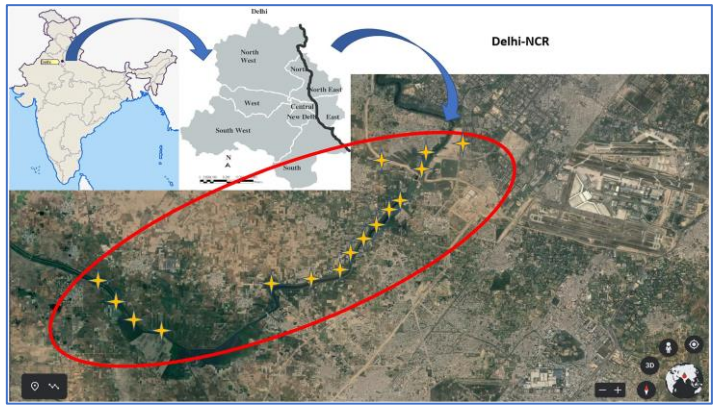
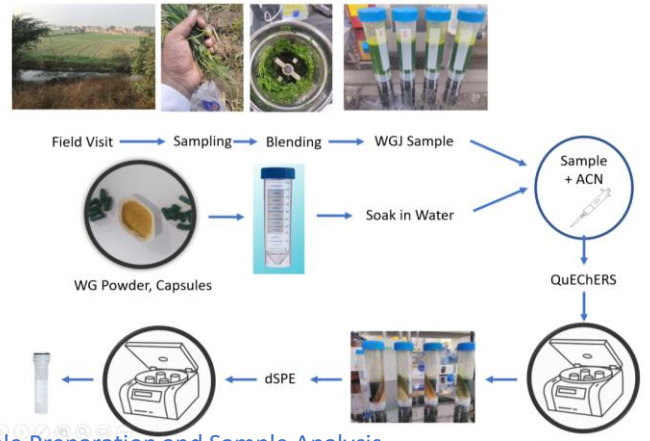
Abstract

Young grass of wheat (*Triticum Sp.*) is a high nutrient functional food known as wheatgrass (WG) or green blood. The immunity booster food supplement is considered organic as there is no spray of pesticides on the crop till its harvest stage. However, occurrence of POPs emerged as threat in accepting WG as a superfood, that is available as juice, powder, tablet, and capsule forms. 241 pesticides were analyzed in random WG population and 38% reported residual pesticides above method LOQ, with metribuzin at 299.7 µg/kg and carfentrazone-ethyl at 19.47 µg/kg both exceeding EU-MRL limits. The chronic and acute risk quotients were calculated to assess the risk to consumers indicating impact of emerging pollutants through soil and irrigation on urban population.

Chemicals and Samples

All LCMS grade solvents and chemical were taken from Honeywell, the Type-1 Water was from Merck-Millipore. The Pesticides Standards, column, QuEChERS, dSPE and 1290-6470 Triple Quad LC-MS/MS instrument were taken from Agilent technologies, USA. WG samples were harvested from Delhi-NCR region with different geographical coordinates as seen in fig, below, while commercial samples were sourced from market.



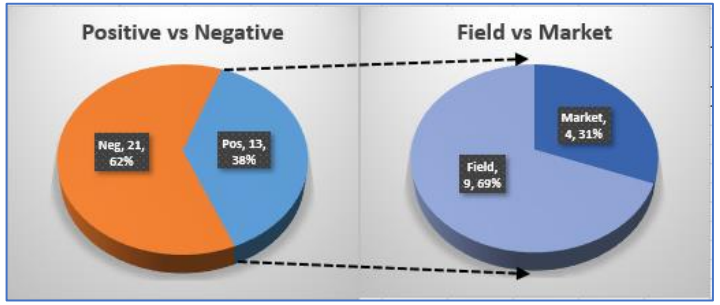


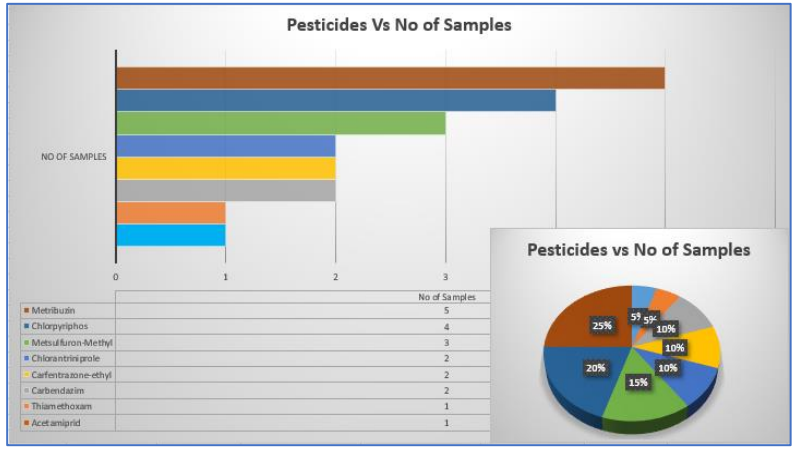
Sample Preparation and Sample Analysis

The powder (2g) and liquid (10g) were processed as shown in above figure. The matrix calibrations were plotted between 0.5-100 µg/kg as per validation norms of ISO/17025 and SANTE in dynamic MRM mode. Recovery factors were applied before reporting final concentration.

Results

Among 34 WG samples, 38% had residual pesticides above method LOQ. Fresh harvest contributed for 69% among total contaminated population, indicating that WG may not be pesticides-free. Multiple samples reported occurrence of same pesticides at residual level e.g metribuzin and carfentrazone-ethyl.





Dietary Risk Assessment

Risk Quotient (RQ) acute and chronic were calculated for Herbicides such as metribuzin, metsulfuron-methyl, carfentrazone-ethyl; Insecticides such as acetamiprid, chlorpyriphos, chlorantriniprole, thiamethoxam and Fungicides such as carbendazim to assess short- and long-term toxicity, respectively. Presence of pesticides in indicates the health hazard to urban population however the Risk Quotient value of <1, making the dietary risk of this superfood to be insignificant.

Conclusion

WG, was well utilized superfood during recent covid-19 pandemic. Current study indicates that WG produce may not be organic. A controlled usage, adequate information are required to prevent uncontrolled usage of pesticides to protect health of people and environment from unknown contaminants present in soil and water.

References

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