# In vitro Evaluation of a Herbal Bionematicide and Its Effect on the Management of Nematodes in Solanum iycoperiscum

Patel, Shloke (School: Hillsborough High School)

Plant-parasitic nematodes account for 14% crop losses globally and $157 billion lost annually. Root-knot nematodes are yield-limiting and threaten crop production. Toxic chemicals, such as oxamyl, found in industry-standard nematicides can kill helpful microbes and present environmental threats. Previous research identified alpha-terthienyl, a pigment in marigolds, with nematicidal properties. The objective of this investigation was to evaluate marigolds as an herbal bio-nematicide to control nematodes compared to industry-standard, vydate. 100 marigold plants were planted and root, stem, and flowers were dried and used to generate extracts by performing steam distillation. Nematodes were extracted from soil culture for in-vitro assay and used for 5 treatments (untreated control, flower, root, stem extract, industry-standard) replicated 10 times. Nematode counts were taken 5 times over 96-hours. 30 tomato plants were used in vivo to determine the effectiveness of treatments against root galling. After 3 weeks of inoculating nematodes, root galling was observed. In the in-vitro study, root extract had the highest average decrease in nematode count (87.4%) compared to flower (85.2%) and stem (60.8%) extracts after 96 hours. In comparison, industry-standard had a reduction of 100%. Paired t-tests also show root extracts as having the lowest p-value (1.31x10^-9) after industry-standard, conveying greater statistical significance. As per the root galling data, marigold extracts had 20.0% less galling compared to untreated control after 3 weeks. In conclusion, the plant extracts were effective in nematode management in vitro, indicating there is significant potential for marigold extracts to be commercially developed.

**Awards Won:**
Fourth Award of $500