SUNN HEMP 'TROPIC SUN' AS A COVER CROP IN EDIBLE GINGER PRODUCTION

Dwight Sato*, CTAHR-Hilo, Bob Joy, NRCS-Molokai, Matthew Wung, NRCS-Hilo

Introduction

In Hawaii, edible ginger (*Zingiber officinales*) is grown as a fresh market commodity and the majority of the production is exported to niche markets in the U.S. mainland, Canada, and Europe. Ginger production has been increasing in recent years and growers in Hawaii have developed a reputation of producing a superior quality product in spite of the many diseases that afflict ginger. Among the more serious pests are root-knot nematodes (*Meloidogyne spp*.) which, if not properly managed, can make a crop unmarketable. The standard commercial practice for nematode control is the use of chemical nematicides or soil fumigants, mainly methyl bromide. This practice is not only costly but hazardous as well. Many ginger growers are small farmers who may lack the means to apply toxic nematicides safely and are looking for sustainable production systems that do not rely soley on chemicals.

Cultural management options to control nematodes and other diseases include sanitation and rotation with a non-host crop. 'Tropic Sun' sunn hemp (*Crotalaria juncea*) is resistant to root-knot nematodes and has been shown to reduce their numbers in soil, allowing the succeeding cash crop to grow and produce normally. Tropic Sun has been used successfully in rotation with various crops. In addition to reducing the nematode population, this legume can add over 145 pounds per acre of nitrogen to the soil resulting in improved crop growth and reduced fertilizer inputs. Tropic Sun has been planted in rotation with ginger to a limited extent in the past; however, the results have been inconclusive. Therefore the objective of this study was to determine the effectiveness of Tropic Sun sunn hemp in controlling nematodes in ginger. Ginger is a long-term crop and the possibility of an increase in nematode population after an initial decrease following the incorporation of the cover crop is a concern.

Materials and Methods

A field test site was selected in Hakalau, on the island of Hawaii, at an elevation of 300 ft. The test site was previously cropped in sugar and has since been naturally succeeded mainly with California grass. The plot area was plowed and roto-tilled twice during the period from early February to early March 1999. Calcium carbonate at 1.2 tons was evenly incorporated in the test plots on March 3, 1999.

The root-knot nematode control treatments selected were 1) a sunn hemp cover crop, 2) fallow or no treatment, and 3) fallow with Vydate application. The sunn hemp was planted on March 8, 1999 in two replicate plots each measuring 17 x 100 feet.. The seeds were evenly broadcast at a rate of 60 lbs per acre and lightly roto-tilled to a depth of 1-2 inches. The sunn hemp cover crop was maintained for 74 days before being mowed and plowed. The cover crop was then allowed to decompose for 19 days. Plant furrows were constructed and pre-plant fertilizer added to each line. The ginger was planted on June 9, 1999 in rows spaced 4.3 ft apart using 1,800 lbs of seeds for the total experiment. The crop was maintained as normally done with adequate fertilizer and

weed control. Vydate at a rate of 2 fl. oz. per plot was hand sprayed over ginger rows on July 5th and August 5th in each of the fallow-vydate replicates. The fallow and the sunn hemp treatments did not receive any Vydate applications.

The ginger crop was grown for 10 months under rain-fed conditions and harvested the following year from April 13 to 20, 2000. Each plot consisted of two border rows buffering two center rows that were harvested for yield data. The harvested ginger was categorized and yield data recorded according to industry grades including no.1 and commercial fresh weights in addition to nematode damaged rhizomes. Monthly rainfall data was recorded for the duration of the trial.

Results

The average marketable and nematode damage yield for each treatment are presented in Graph 1. Ginger grown following the sunn hemp cover crop resulted in approximately one half the yield of the control treatment. The fallow and the fallow-Vydate treatment resulted in greater marketable yield. The percent of nematode damaged ginger in comparison to the marketable yield, ranged from 25-29 percent in all of the treatments. The average post-harvest soil nematode counts are shown in Graph 2. The sunn hemp plots resulted in the highest concentration of root knot nematodes per pint of soil. The monthly rainfall for the growth period of the cover crop and main crop is charted in Graph 3. Low rainfall was observed in May, June and July at a critical time just before the sunn hemp was incorporated into the soil and the ginger crop planted.

Discussion/Conclusion

In this demonstration, a cover crop of sunn hemp 'Tropic Sun' substantially reduced marketable yield and did not adequately suppress root-knot nematode damage in ginger root. Ginger is a long term crop and the root-knot controlling effects of sunn hemp may not be suppressing the late nematode population growth as it normally does for shorter term cropping systems. The soil in the root zone of the sun hemp at the time of incorporation was observably drier than the fallow plots. This dry condition appeared to be critical and probably affected the germination and the early growth phase, in addition to the decomposition process of the sunn hemp just before planting. The Vydate treatment also did not show any benefit over the fallow only treatment. This chemical treatment probably required more frequent applications to suppress nematode population through out the growing season. Other selected cover crops are currently being investigated for reducing root-knot nematode in edible ginger. **Using sun hemp as a cover crop under non-irrigated, rainfed conditions may not be a suitable sustainable practice for nematode control in a long term ginger crop.**

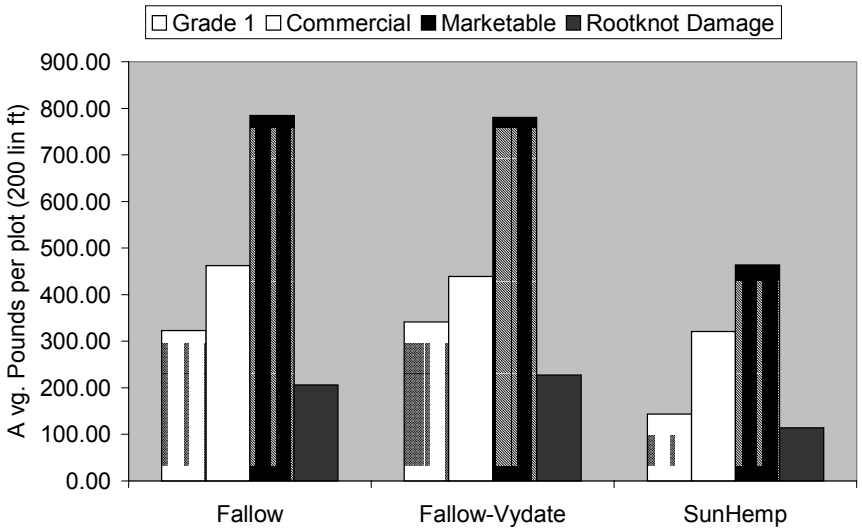
Acknowledgement

The authors wish to acknowledge Peter Olivera for his technical guidance on ginger culture and for allowing us the use of his land and facilities to conduct this study.

Controlling Root Knot Nematode with 'Tropic Sun' Sunn Hemp for the Sustainable Production of Ginger

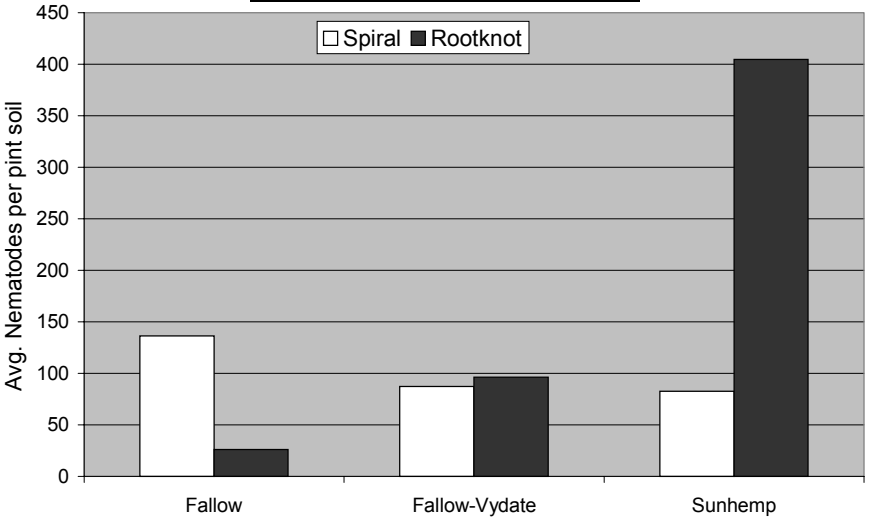
Graph 1

Ginger Yield and Nematode Damage per Plot



Graph 2

Post Harvest Soil Nematode Counts



Graph 3

Monthly Rainfall

Mar 1999 to May 2000