EFFECT OF PLANT EXTRACTS ON DITYLENCHUS DIPSACI, ROOT- KNOT NEMATODE OF TOMATO IN AN ARTIFICIAL ECOSYSTEM

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Abstract: D. dipsaci occurs locally in most temperate areas of the world (Europe and the Mediterranean region, North and South America, northern and southern Africa, Asia). D. dipsaci is known to attack over 450 different plant species, including many weeds. It is one of the most devastating plant-parasitic nematodes, especially in temperate regions. Typical symptoms of nematode injury can involve both aboveground and below ground plant parts. Foliar symptoms of nematode infestation of roots generally involve stunting and general unthriftiness, premature wilting and slow recovery to improved soil moisture conditions, leaf chlorosis (yellowing) and other symptoms characteristic of nutrient deficiency. Plants exhibiting stunted or decline symptoms usually occur in patches of non uniform growth rather than as an overall decline of plants within an entire field. Nematode causes swellings and distortion of aerial plant parts and necrosis or rotting of stem bases, bulbs, tubers and rhizomes .Suppressed shoot growth of tomato, nematodes suppress plant growth and increase plant mortality regardless of plant susceptibility, resistance, or tolerance. The economic importance of Root-knot nematode on tomato is increasing as most chemical control agents for RKNs have been prohibited for environmental and health reasons. As other options, it can be managed through cultural practices like crop rotation, use of resistant varieties, biological. However, strategies of cultural control are less effective and crop rotations are too difficult to implement because of the wide host range.

Pronounced reduction in final nematode population density, root-knot index and a significant increase yield per plant and total yields of tomato were observed from plants treated with 5% concentration of lantana and marigold leaf extracts compared to any other tested plant extract. These plant extracts have played an important role in reducing the nematode infestation and population build up on tomato. Thus, these results suggest that application of bitter leaf, lantana and Mexican marigold leaf extracts would be a good alternative to manage root-knot nematode populations in tomato production in any given ecosystem.

Keywords: Ecosystem, Mortality, Root-knot, Leaf extract ,Resistant

Introduction: Tomato is the second most important Solanaceous vegetable crop after potato. It is native to South America and is widely cultivated in 140 countries of the world. Tomato ranks next to the potato crop and ranks first among the processing crops in the world .Tomato is commonly consumed in our daily life and it is a good source of antioxidants .Tomato contains 95.3% of water, 0.07% calcium and niacin, all of which have great importance in metabolic activities of humans. With high nutritional value, it provides a balance source of Vitamin A, C and E needed to maintain good human health. Varied climatic adaptability and high nutritive value made the tomato cultivation more popular in the recent years. Tomato crop is vulnerable to infect by bacterial, viral, nematode and fungal diseases.

Geographical Distribution: *D.dipsac(*Kuhn1857, Filipjev193), is known to attack over 450 different plant species, including many weeds. Root-knot nematodes are found in all temperate area of the world,(Europe, Mediterranean region North and South America and Asia)*D. dipsac* among the plant-parasitic nematodes of greatest economic impact worldwide and widely distributed mainly in temperate areas. Almost 500 different plant species are known as hosts for D.dipsaci but the different biological races of this nematode each have limited host-range D. dipsaci lives mostly as an endo-parasite in aerial parts of plants (stems, leaves, flowers) but also attacks bulbs, tubers and rhizomes.

Biology and Ecology: Nematodes are one of the most important constraints to crop productivity, and on a worldwide basis, they cause 12 % annual loss in the yield of important food and fibre crops. D. dipsaci is a migratory Endo parasite that feeds upon Parenchymatous tissue in stems and bulbs, causing the breakdown of the middle lamellae of cell walls. Feeding often causes swellings and distortion of aerial plant parts (stems, leaves, flowers) and necrosis or rotting of stem bases, bulbs, tubers and rhizomes. During cold storage of bulbs and tubers, D. dipsaci and rotting may continue to develop.

Area of study: St. Pious X Degree & P.G College for Women maintains an Artificial ecosystem, a vegetable garden an important production region to supply the vegetables to the inmates of the student hostel. In recent years high infestation of D.dipsaci reduced tomato plant growth and the production of tomatoes. Since most commonly used nematodes are expensive and are being with drawn from the market due to their harmful effects on humans. Populations of D.dipsaci of the root-knot and stem were recovered from shoot tissue and associated soil for analysis. The objectives of the study were to

determine the extent of infestation and a controlled nematode management strategies using plant extracts.

Method of Study:

Extraction Of Nematodes From Soil:

1) Decanting method

2) Sieving-Cobb's method

The Cobb's decanting and sieving method is one of the most commonly used methods for extraction of nematodes from Soil . The nematodes ***Ditylenchus. dipsaci*** were extracted from infested tissues of tomato root-knot by a modified Baermann"s funnel method. Extraction from plant tissue *D. dipsaci* can be detected by placing plant tissue with suspected infestation into water. Any plant material to be tested is cut into pieces or sliced and placed on a Baermann funnel on a sieve covered with soft filter paper (e.g. cotton wool filter). These nematode species are very mobile and will usually emerge from the tissues within 2 to 4 h; the water from the bottom of the funnel can then checked by microscope for the presence of nematodes. After 24 hrs, 10-15 ml of nematode suspension was taken into a beaker by opening the pinch cock. It was then transferred to 100 ml measuring cylinder and was made to 60 ml by adding water. It was bubbled with a pipette and 3 ml of suspension was transferred to counting dish. Population of nematodes was counted under stereoscopic microscope at magnification of 50 x and multiplied by 20 to get the population present in 100 gms of soil.

Preparation of Plant Extracts: For its management, different plant species (botanicals) are being tried in different forms as an alternative to Nematicides. The nematicidal potential of Bitter guard leaf (Vernonia amygodalina), lantana (Lantana camara), Mexican marigold (Tagetes minuta), was assessed against **Ditylenchus dipsaci,** on tomato under field conditions. Aqueous extracts of the plants (30 g/100 ml w/v) were evaluated at 3 and 5% concentrations which was applied as soil drench one day after transplanting the seedling. The plant extract was also sprayed in the experimental field that was infested with D.dipsaci.

Table showing plant extracts used:

S/N	Common Name	Botanical Name	Plant part used
1	Bitter guard leaf	Vernonia amygodalina	leaves
2	lantana	Lantana camara	leaves
3	Mexican marigold	Tagetes minuta	leaves

Data collected: The following data were collected after nematode treated with plant extracts.

Plant height: The plant height was measured in centimeters for each plant from the soil line to the tip of the stem.

Nature of leaves: The nature of leaves was observed.

Shape of thee nematodes: When the dead nematodes were studied under the microscope they had curly (∞-shape).

Table-2-Treating the nematodes with plant extracts

S/N	Morphometric and morpho-anatomical characters of Tomato plant	Before adding plant extracts	After adding the plant extracts to the soil
1	Plant Height	11"(stunted)	20 "(Normal)
2	leaf Chlorosis	Yellow	Green
3	Shapes of nematodes	Slender transparent	curly (∞-shape)

Conclusion: Pronounced reduction in final nematode population density, root-knot index and a significant increase yield per plant and total yields of tomato were observed from plants treated with 5% concentration of lantana and Mexican marigold leaf and bitter guard extracts compared to any other tested plant extract. These plant extracts might have played an important role in reducing the nematode infestation. The mortality of D.dipsaci treated with extracts from these tissues was studied under laboratory conditions.

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