Journal of Spices and Aromatic Crops 9 (1) : 51-54 (2000)

Incidence of insect pests of turmeric (*Curcuma longa* L.) in northern Karnataka, India[1]

Y K Kotikal & K A Kulkarni[2]

Department of Agricultural Entomology
College of Agriculture
University of Agricultural Sciences
Dharwad - 580 005, India.

Received 22 December 1998; Revised 28 December 1999; Accepted 28 January 2000.

Abstract

A roving survey conducted during 1996–97 at three phases of crop growth in turmeric (*Curcuma longa*) in northern districts of Karnataka (India) revealed the incidence of major insect pests like rhizome fly (*Mimegralla coeruleifrons*), shoot borer (*Conogethes punctiferalis*), lacewing bug (*Stephanitis typicus*), leaf roller (*Udaspes folus*), thrips (*Panchaetothrips indicus*) and scale insects (*Aspidiotus curcumae*) in all the areas and minor pests like various species of leaf beetles, caterpillars and grasshoppers. The population of rhizome fly was high (up to 0.88 adults per m^2) in Raibag, Athani, Mudhol, Indi, Chincholli and Basavakalyan taluks at all stages of crop growth. However, most of the rhizomes that contained maggots of rhizome fly were rotten. Shoot borer was predominant in early vegetative phase (45–60 days) and grand growth stage (100–120 days) of the crop in Raibag, Chikodi, Jamakhandi, Indi and Humanabad taluks.

Key words: *Curcuma longa* , insect pests, survey, turmeric.

Introduction

Among the various production constraints in turmeric (*Curcuma longa* L.) in India, infestation by insects is a major one. Several insect pests are reported to inflict damage to turmeric at different stages of growth at various places of its cultivation (Koya *et al.* 1991; Premkumar *et al.* 1994; Kotikal 1998). Scale insects (*Aspidiella hartii* Ckll.), lacewing bug (*Stephanitis typicus* Dist.), thrips (*Panchaetothrips indicus* Bagn.), shoot borer (*Conogethes punctiferalis* Guen.) and leaf roller (*Udaspes folus* Cram.) are reported from Karnataka (Puttarudraiah 1983). In northern Karnataka, turmeric is prone to attack by several insect pests and a survey was conducted in five districts of this region to record the incidence of various insect pests during different phases of crop growth.

Material and methods

During 1996, a roving survey was conducted by selecting five locations in each taluk of Gokak, Raibag, Athani, Hukkeri and Chikodi of Belgaum District; Mudhol, Jamakhandi and Indi of Bijapur District; Aland and Chicholli of Gulbarga District and Basavakalyan, Humananabad and Bidar of Bidar District. Three visits were undertaken during different stages of crop growth namely, early vegetative phase (45–60 days after planting), grand growth stage (100–120 days after planting) and at maturity (210–230 days after planting). The incidence of insect pests was recorded using suitable techniques for different insects as explained below.

Shoot borer (*Conogethes punctiferalis*) : The number of plants showing row of holes across the leaf blade after unfurling or dead hearts were counted as infested plants from a randomly selected area of 1 m^2 (6–8 clumps) at five spots.

Rhizome fly (*Mimegralla coeruleifrons*): As adults were not swift fliers, it was possible to count them

[1]Part of Ph D Thesis submitted by the senior author to University of Agricultural Sciences, Dharwad, under the guidance of the second author.

[2]Present address : Kittur Rani Channamma College of Horticulture, Arabhavi - 591 310, Karnataka, India.

on plants while resting than net sweeping. Hence the flies were counted from roughly 1 m^2 (6–8 clumps) area and such five randomly selected spots formed replications. Maggots and pupae were counted by splitting the rhizomes of plants from the same area of 1m^2 (6–8 clumps).

Leaf roller (*Udaspes folus*) : The incidence of leaf roller was recorded by counting the leaf rolls per clump on 10 randomly selected clumps in a plot of 10 *guntas* (10 m x 10 m).

Other caterpillars (*Catopsila pomona* F., *Spilarctia obliqua* (Wlk.), *Spodoptera litura* F.): The number of live larvae from 10 randomly selected clumps were counted in a plot of 10 *guntas*

Leaf beetles and weevils (*Lema* spp. *Epilachna* sp., *Myllocerus* spp.) : The number of adult beetles and weevils were counted from 10 randomly selected plants.

Lacewing bug *(Stephanitis typicus)* : The nymphs and adults from three leaves selected one each from top, middle and bottom portions of five randomly selected plants were counted from a plot of 10 *guntas.*

Grasshoppers (*Orthacris simulans* B., *Cyrtanthacris ranacea* Stoll., *Letana inflata* Brunner, *Phenoroptera gracilis* Burm.): The nymphs and adults of grasshoppers from 25 randomly selected plants were counted in a plot of 10 *guntas.*

Thrips (*Panchaetothrips indicus*): Total number of larvae per top 3 leaves from 10 randomly selected plants of 10 *guntas* was counted.

Scale insects (*Aspidiotus curcuma* Gr., *Aspidiella hartii*) : Scale insects were counted on 3 bottom leaves/all pseudostems/all rhizomes from 5 plants in 1 *gunta* area replicated 5 times and average per leaf/pseudostem or rhizome worked out.

Results and discussion

The incidence of insect pests at different locations during the surveys in northern Karnataka is presented in Tables 1 and 2.

Rhizome fly: Population (mean) of *M. coeruleifrons* was 0.46 ± 0.19, 0.57 ± 0.18 and 0.07 ± 0.04 adults per m^2 at early vegetative phase, grand growth stage and at maturity, respectively. The mean incidence level was higher in Raibag, Athani, Mudhol, Indi, Chincholli and Basavakalyan taluks.

Table 1. Incidence of rhizome fly and shoot borer on turmeric in northern Karnataka

Location	Variety	Rhizome fly (adults/m^2)			Per cent shoot borer infestation/m^2		
		I	II	III	I	II	III
Belgaum District							
Gokak	Local, Cuddapah	0.36±0.12	0.44±0.12	0.06±0.05	4.33±1.67	6.67±2.67	0.00±0.00
Hukkeri	Cuddapah	0.40±0.10	0.64±0.15	0.08±0.05	5.00±2.00	9.33±3.50	0.33±0.33
Chikodi	Cuddapah, Salem	0.60±0.17	0.72±0.17	0.08±0.05	10.00±2.50	7.33±3.50	3.33±0.33
Raibag	Salem	0.68±0.15	0.88±0.19	0.14±0.05	11.33±2.50	6.67±3.67	0.00±0.00
Athani	Salem, Rajapuri	0.64±0.12	0.72±0.17	0.16±0.06	5.33±1.67	8.33±1.67	1.33±1.33
Bijapur District							
Mudhol	Cuddapah, Rajapuri	0.56±0.15	0.54±0.18	0.08±0.05	3.33±1.50	9.33±2.50	0.00±0.00
Jamakhandi	Cuddapah	0.48±0.15	0.76±0.16	0.04±0.04	7.00±1.50	14.00±2.83	0.00±0.00
Indi	Rajapuri	0.50±0.16	0.64±0.15	0.04±0.04	6.00±1.50	12.00±3.00	1.67±0.83
Gulburga District							
Aland	Local, Rajapuri	0.20±0.10	0.26±0.18	0.02±0.02	7.00±2.50	8.00±2.50	0.67±0.17
Chincholli	Cuddapah	0.84±0.15	0.64±0.18	0.04±0.04	6.67±2.00	7.00±2.00	0.34±0.34
Bidar District							
Bidar	Rajapuri	0.20±0.10	0.36±0.10	0.06±0.05	7.67±2.83	14.67±2.50	2.00±1.02
Basavakalyan	Cuddapah	0.76±0.12	0.40±0.15	0.02±0.01	6.33±2.50	17.00±2.62	1.67±0.83
Humanabad	Kasturi,Cuddapah	0.30±0.15	0.44±0.16	0.06±0.04	10.33±2.67	10.33±2.50	2.00±1.02
Mean		0.46±0.19	0.57±0.18	0.07±0.04	7.00±2.33	10.00±3.33	1.20±1.00

Each value is an average ± SD of 25 observations (5 each from 5 locations in each taluk)
I = At early vegetative phase (45–60 days); II = At grand growth stage (100–120 days); III = At maturity (210–230 days)

Table 2. Incidence of insect pests of turmeric in northern Karnataka

Location	Lacewing bugs/leaf			Thrips*/leaf			Leaf beetles*/plant		
	I	II	III	I	II	III	I	II	III
Belgaum District									
Gokak	0.33±0.15	1.53±0.27	0.00±0.00	1.60±0.11	2.69±0.23	0.46±0.17	0.42±0.21	0.52±0.21	1.04±0.16
Hukkeri	0.26±0.11	2.52±0.43	0.20±0.05	1.56±0.17	1.80±0.32	0.07±0.08	0.48±0.18	0.80±0.15	0.80±0.15
Chikkodi	0.24±0.13	1.64±0.35	0.06±0.07	2.05±0.19	2.28±0.37	0.46±0.12	1.02±0.16	0.76±0.14	1.40±0.15
Raibag	0.24±0.12	1.84±0.32	0.19±0.11	1.06±0.15	1.22±0.18	0.00±0.00	1.34±0.15	0.96±0.14	1.40±0.15
Athani	0.00+0.00	2.26±0.55	0.46±0.12	0.86±0.09	0.79±0.12	0.00±0.00	1.60±0.12	0.60±0.16	1.12±0.16
Bijapur District									
Mudhol	0.66±0.14	2.53±0.57	0.00±0.00	0.24±0.18	0.71±0.11	0.00±0.00	0.48±0.08	0.60±0.11	0.88±0.15
Jamakhandi	0.33±0.09	1.46±0.31	0.33±0.11	0.44±0.15	1.10±0.09	0.26±0.11	0.52±0.11	1.28±0.21	1.20±0.18
Indi	0.26±0.08	1.53±0.17	0.00±0.00	1.06±0.21	2.28±0.22	0.46±0.12	0.62±0.12	0.96±0.20	1.00±0.25
Gulburga District									
Aland	0.00±0.00	1.39±0.21	0.00±0.00	0.66±0.23	1.97±0.13	0.00±0.00	0.56±0.12	1.20±0.23	1.80±0.36
Chincholli	0.26±0.09	2.79±0.35	0.00±0.00	0.33±0.18	0.67±0.11	0.53±0.15	0.36±0.10	0.84±0.11	1.20±0.30
Bidar District									
Bidar	0.13±0.07	0.66±0.07	0.06±0.07	0.46±0.12	1.59±0.17	0.00±0.00	0.28±0.09	0.68±0.11	1.40±0.25
Basavakalyan	0.26±0.08	1.44±0.18	0.06±0.07	0.46±0.11	1.86±0.18	0.13±0.05	0.30±0.08	0.88±0.12	1.04±0.15
Humanabad	0.00±0.00	0.53±0.13	0.00±0.00	0.46±0.12	1.79±0.15	0.13±0.08	0.28±0.08	0.64±0.11	1.24±0.16
Mean	0.21±0.18	1.70±0.68	0.11±0.15	0.86±0.56	1.59±0.65	0.19±0.21	0.63±0.42	0.82±0.23	0.98±0.29

Each value is an average ± SD of 25 observations (5 each from 5 locations in each taluk)
I= At early vegetative phase (45–60 days), II = At grand growth stage (100-120 days), III = At maturity (210–230 days)
* = Population irrespective of species

The mean number of maggots and pupae per m^2 was 1.70–31.75 and 1.30–30.20, respectively, during various stages of the crop. Most of the rhizomes which contained maggots and pupae were affected by disease and were in a rotting condition. Ghorpade *et al.* (1983) conducted a similar study in Maharastra and the incidence level of the rhizome fly was comparable to the present study.

Shoot borer : The mean percentage of plants infested by the shoot borer was 7.00 ± 2.33, 10.00 ± 3.33 and 1.20 ± 1.00 per m^2 at early vegetative phase, grand growth stage and maturity, respectively. The pest incidence was higher at vegetative phase and grand growth stage. Raibag, Chikodi, Jamakhandi, Indi and Humanabad taluks had higher incidence of the pest compared to other areas.

Lacewing bug : The mean population of lacewing bug was 0.21 ± 0.18, 1.70 ± 0.68 and 0.11 ± 0.15 per plant in early, grand growth and maturity stages of the crop, respectively. They were particularly predominant in Hukkeri, Mudhol, Chincholli and Basavakalyan areas during grand growth stage. This pest was also reported from Sangli, Satara and Kolhapur districts of Maharastra (Patil *et al.* 1988).

Thrips : The mean population of thrips was 0.86 ± 0.56, 1.59 ± 0.65 and 0.19 ± 0.21 per plant during early, grand growth and maturity stage of the crop, respectively. The population of thrips was higher in Gokak, Indi, Aland and Basavakalyan taluks.

Leaf beetles : The population of leaf beetles irrespective of species was 0.63 ± 0.42, 0.82 ± 0.23 and 0.98 ± 0.29 per plant during first, second and third observation, respectively. Their activity was comparatively higher in Athani, Jamakhandi, Aland and Bidar taluks.

Caterpillars : The caterpillars irrespective of species numbered 0.20 ± 0.09, 0.27 ± 0.13 and 0.16 ± 0.16 per plant at early, grand growth and maturity stage of the crop, respectively. The incidence of caterpillars was higher in Hukkeri, Gokak, Mudhol, Chincholli and Humanabad taluks.

Grasshoppers: Grasshoppers were seen sporadically in all the areas surveyed with an mean population of 0.05 ± 0.02, 0.13 ± 0.13

Table 3. Incidence of insect pests of turmeric in northern Karnataka

Location	Caterpillars*/leaf			Grasshoppers*/leaf			Scales*		
	I	II	III	I	II	III	I[a]	II[b]	III[c]
Belgaum District									
Gokak	0.02±0.02	0.24±0.12	0.10±0.05	0.06±0.04	0.08±0.04	0.16±0.04	0.02±0.02	0.26±0.12	0.32±0.12
Hukkeri	0.12±0.06	0.24±0.10	0.18±0.16	0.02±0.02	0.04±0.04	0.11±0.05	0.06±0.04	0.20±0.10	0.36±0.13
Chikkodi	0.20±0.05	0.12±0.06	0.08±0.04	0.12±0.06	0.08±0.05	0.20±0.05	0.00±0.00	0.32±0.12	0.48±0.14
Raibag	0.12±0.06	0.14±0.08	0.12±0.06	0.03±0.01	0.06±0.05	0.17±0.10	0.08±0.04	0.64±0.16	0.76±0.14
Athani	0.12±0.06	0.48±0.16	0.26±0.10	0.06±0.04	0.06±0.03	0.13±0.10	0.12±0.06	0.76±0.18	0.80±0.20
Bijapur District									
Mudhol	0.32±0.10	0.48±0.16	0.64±0.10	0.06±0.04	0.56±0.15	0.40±0.10	0.06±0.04	0.48±0.15	0.76±0.15
Jamakhandi	0.16±0.10	0.18±0.16	0.00±0.00	0.05±0.05	0.05±0.05	0.13±0.10	0.02±0.02	0.20±0.10	0.36±0.12
Indi	0.14±0.09	0.18±0.12	0.08±0.04	0.02±0.02	0.15±0.10	0.20±0.10	0.00±0.00	0.00±0.00	0.48±0.15
Gulburga District									
Aland	0.28±0.11	0.18±0.13	0.12±0.06	0.03±0.02	0.06±0.04	0.15±0.05	0.08±0.04	0.32±0.12	0.52±0.15
Chincholli	0.24±0.12	0.44±0.12	0.28±0.05	0.07±0.05	0.11±0.10	0.14±0.07	0.08±0.04	0.64±0.18	0.48±0.15
Bidar District									
Bidar	0.32±0.10	0.40±0.10	0.12±0.06	0.03±0.01	0.15±0.10	0.15±0.05	0.00±0.00	0.76±0.19	0.52±0.17
Basavakalyan	0.30±0.10	0.33±0.11	0.13±0.05	0.03±0.02	0.15±0.10	0.20±0.10	0.06±0.04	0.48±0.16	0.76±0.18
Humanabad	0.30±0.10	0.44±0.12	0.02±0.11	0.03±0.02	0.07±0.05	0.20±0.10	0.02±0.02	0.32±0.12	0.48±0.12
Mean	0.20±0.09	0.27±0.13	0.16±0.16	0.05±0.02	0.13±0.13	0.18±0.07	0.05±0.03	0.41±0.23	0.54±0.17

Each value is an average ± SD of 25 observations (5 each from 5 locations in each taluk)
I= At early vegetative phase (45–60 days), II = At grand growth stage (100–120 days), III = At maturity (210–230 days)
* = Population irrespective of species; [a]on leaves, [b]on shoots, [c]on rhizomes

and 0.18 ± 0.07 per plant during early, middle and later state of crop growth, respectively. They were more devastating in Mudhol at later stages of the crop probably because of the absence of other field crops in the location.

Scale insects : *A. curcumae* was seen on leaves in the early stage with a mean density of 0.05 ± 0.03 per leaf and later (both species) on pseudostems (0.41 ± 0.23) and rhizomes (0.34 ± 0.17) at harvest. They were predominant in Athani, Mudhol, Chincholli and Bidar taluks.

The survey indicated that insect pests like rhizome fly, shoot borer, lacewing bug and scale insects which were seen in all the areas surveyed could be considered as major pests of turmeric in northern Karnataka. Other insect pests like leaf beetles, caterpillars and grasshoppers could be considered as minor pests.

Acknowledgement

The first author is grateful to the University of Agricultural Sciences, Dharwad, for providing part time facilities to conduct Ph D studies.

References

Ghorpade S A, Jadhav S S & Ajri B S 1983 Survey of rhizome fly on turmeric and ginger in Maharastra. J. Maharastra Agril. Univ. 8 : 292-293.

Kotikal Y K 1998 Studies on the insect pests of turmeric, *Curcuma longa* L. with particular reference to the rhizome fly *Mimegralla coeruleifrons* Macq. (Micropezidae : Diptera). PhD Thesis, University of Agricultural Sciences, Dharwad.

Koya K M A, Devasahayam S & Premkumar T 1991 Insect pests of ginger (*Zingiber officinale* Rosc.) and turmeric (*Curcuma longa* L.) in India - a review. J. Plantn. Crops 19 : 1-13.

Patil A P, Thakur S G & Mohalkar A R 1988 Survey and seasonal incidence of pests of turmeric and ginger in western Maharastra. Indian Cocoa Arecanut Spices J. 2 : 47-48

Premkumar T, Devasahayam S & Koya K M A 1994 Pests of spice crops. In : Chadha K L & Rethinam P (Eds.) Advances in Horticulture Vol. 10. (pp. 792-873). Malhotra Publishing House, New Delhi.

Puttarudraiah M 1983 A Guide for Cultivation and Protection of Important Crops. S V Rangaswami & Co. Ltd, Bangalore.

Sengupta G C & Behura B K 1957 On the biology of *Lema praeusta* Fab. J. Econ. Ent. 50 : 471-47.