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Research Article

HARMFUL SYNTOMIDS (SYNTOMIDAE - LEPIDOPTERA) OF AGRO AND FOREST CROP PLANTS FROM WESTERN MAHARASHTRA, INDIA

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ABSTRACT
Syntomids (Syntomidae - Lepidoptera) caterpillars feed on several agricultural and non-agricultural crop plants from Western Maharashtra, India and affect the growth and yield of the crops. Therefore, syntomid diversity was studied during the years 2011-2013 from Western Maharashtra. A total of 15 species belonging to genera *Syntomoides*, *Syntomis* and *Callitomis* have been reported with respect to their morphological features, distribution, abundance, host plants, damage to crops, life cycle and control measures.

Keywords: *Syntomid Diversity, Abundance Host Plants, Damage, Cycle, Control*

INTRODUCTION
Insect diversity has occupied an important place on national agenda as it is concern with the integral aspect of human life (Ramamurthy and Ghai, 1993). The biodiversity of insects have both positive and negative aspects since some of the insects are very destructive to crop plant diversity which is very powerful source of survival of humans and other animals.
Therefore, harmful insects should be suppressed below the level of economic damage and useful insects should be conserved, protected and sustainably used in agricultural and industrial purpose. The objective of the present work was to highlight diversity of destructive syntomids of crop plants, their features and control measures from Kolhapur region, India. In past, syntomids have been studied by Hampson (1892), Pandharbale and Sathe (2001), Gadagkar *et al.*, (1990), Sathe (1998), Sathe and Pandharbale (2004, 2008) etc.

MATERIALS AND METHODS
Syntomid moths and larvae have been collected from different fields of agricultural and other crop plants at evening and morning by one man one hour search and by insect net and hand picking methods. Spot observations were made on the life cycle, nature of damage, host plants and seasonal abundance throughout the year on various crop plants.
In addition, eggs, larvae and pupae were also collected from the field and reared in the laboratory (27± 1^{o}C, 70-80% R.H. & 12 hr photoperiod) for life cycle studies. For preventive control of syntomids, egg masses and larvae were collected from crop plants at morning and evening and destroyed in dipping into kerosinized water. For screening parasitoids, field larvae were collected and reared on their host plants in laboratory. For chemical control of syntomids, crop plants were sprayed with 0.03% Azadirachtin / Malathion or 0.15 carbaryl at evening or morning. Insects have been identified by consulting relevant literature.

RESULTS AND DISCUSSION
Results are recorded in tables 1 to 3. A total of 15 species belonging to the genera *Syntomoides*, *Syntomis* and *Callitomis* have been reported feeding on various crop plants including mulberry, jowar, caster, sunflower, cowpea, red gram, ornamental plants in garden from agroecosystems and plain region, *vitex* spp., wild convolvulaceae, mango, Jamun, Terminalia and teak from forest ecosystems of Western Maharashtra.

Table 1: Diversity, biology and abundance of syntomid from Western Maharashtra

Sr. No.	Species	Features	Host plants	Damage status	Life cycle	Abundance
1.	*Ceryx godarti*	Moths with 6 & 3 clear transparent spots in fore & hind wings respectively. Larvae brownish, black, hairy.	Mulberry *Morus alba* L. *Sorghum* sp.	Defoliator	47 days	Feb - Aug; Ghats & plains
2.	*Syntomis passalis*	Moths with black wings with purple spot, hyaline spots small, 2 medial, 2 sub marginal and one sub basal and sub apical. hindwing with one submarginal spot	M. alba caster, Red gram, sunflower, ornamental plants	Defoliator	48 days	Feb - Aug. Ghats & plains
3.	*Syntomis huebneri*	Abdomen with tip black, frons yellow, fore wing with 6-7 hyaline spots, hind wing with large basal hyaline patch & two apical small spots	Cow pea cotton, sunflower,	Defoliator	45 days	Feb - Aug., Plains
4.	*Suntomis mahabaleshwari*	Wing expanse 30 mm, 9 spots on fore wings & 2 on hind wings	Oak, wild convulvoceae	Defoliar	50 days	Feb. - Aug. Ghats
5.	*Syntomis serrata*	Moth with black strip between vein 5 and 6, abdomen greenish black with yellow bands	Convulvoceae wild plants	Defoliator	50 days	Feb. - Aug. Ghats
6.	*Syntomis aperiens*	Abdomen black with yellow bands, male antenna bipectinate, fore wing 7 spots & hind with hyaline patch	Convulvoceae wild plants	Defoliator	44 days	Feb. - Aug., Ghats & plain
7.	*Syntomis multigutta*	Male antenna serrated, simple in female, wings yellow hyaline, veins & margins black; collar, tegulae and abdomen scarlet	Oak	Defoliator	52 days	Aug - March Forests
8.	*Syntomis musa*	Male antenna bipectinate and	Nilgiri	Defoliator	44 days	Aug - April Forest, Ghats

		female serrated. Moth dull back, large yellow spot on prothorax, hind wing hyaline patch on disk, divided into four by veins. Fore wing with 4 hyaline spots				
9.	*Syntomis aterea*	Fore with 4 hyaline spots, 2 medial & 2 submarginal and one each on sub basal and sub apical region, Hind wing with 2 sub apical spots	*Vitex* sp.	Defoliator	50 days	July - April Forests, Ghats
10.	*Syntomis indica*	Wing expanse 45 mm; female Antenna serrated, forewing with 6 transparent spots.	Mulberry	Defoliator	48 days	Aug - March Plain & forest
11.	*Syntomoides imaon*	Abdomen with 2 yellow bands, antennae simple in both sexes, frons & collar yellow, Forewing with seven hyaline spots and hind wing sub apical patch	Mulberry, *Vitex* sp.	Defoliator	46 days	Aug. - March Plain & forest
12.	*Syntomoides godarti*	Frons yellow, hind wing with narrow black margin and hyaline	*Vitex* sp.	Defoliator	51 days	Aug. Forest
13.	*Syntomoides hydatia*	Forewing with five hyaline spots, wing expanse 24 mm	Teak *Tectona* sp.	Defoliator	45 days	Aug - Nov. Ghats
14.	*Syntomoides shivajiensis*	7 white transparent spots on fore wing, compact 3 spots on hind wing, 2 golden yellow bands on abdomen	*Vitex* sp. *Tectona* sp.	Defoliator	50 days	Aug - Nov. Ghats, plain
15.	*Callitomis syntomoides*	Wing expanse 34 mm, hind wing with 2 hyaline spots and Fore wing with 5 spots	*Terminalia* sp. Bamboo	Defoliator	44 days	Aug - Nov. Ghats

Syntomid characteristics, host plants, damage caused by larvae to crop plants, life cycle, distribution and abundance are recorded in table 1. *Ceryx godarti*, *Syntomis passalis* and *Syntomis huebneri* were abundant in plains and agroecosystems while, most of the other species recorded in table-1 were confined to forest ecosystems. Spraying the infested crop plants with 0.03% Azadiractin or 0.15% carbary or 0.03% malathion controlled the syntomid diversity from both agro and forest ecosystems. The preventive control measures such as collection and destruction of egg masses, and larvae found on crops have also helped for syntomid pest control. It has been also noticed that the larvae of syntomids were parasitized like *Apanteles* spp. The parasitoids have given pure honey for 2 days in the laboratory and released in the field for parasitization of natural population of syntomid larvae and thus, control of them. This was most effective method for pest control in forest ecosystem wherein pesticidal treatment to crop is difficult.

The family Syntomidae contains seven genera namely, *Syntomoides, Syntomis, Callitomis, Tricheta, Psichote, Naclia* and *Euchromia* (Hampson, 1892). From India, 75 species have been described out of which 72 species have been described by Hampson (1892). Sathe and Pandharbale (2001) added one new species from this family from Western Ghats. Life cycles of wasp moths, *Amata passalis* and *Ceryx godarti* were studied by Sathe (1998) on mulberry from Maharashtra wherein the life cycles from egg to adult were completed in 48-51 days and 47-48 days respectively. The life cycles and control measures suggested in the paper will add great relevance in protecting economically importance crop plants from both forest and agro ecosystems.

Sathe and Pandharbale (2008) reported and described six new species *Syntomoides shivajiensis, Syntomis indica, Syntomis satarensis, Syntomis shivajiensis, Syntomix vitex* and *Syntomis mahabaleshwari* from the environment of Western Ghats of Kolhapur and Satara region. They also reported *Syntomis quadrifaciata* and *Syntomis divisa* from Western Ghats of Kolhapur, Maharashtra. However, they have not reported the life cycle, damage to crop plants and control measures. However, the present data will be helpful for control of destructive syntomids of crop plants from Kolhapur region.

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