

RESEARCH NOTES:

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Biology of the Sorghum Midge (*Contarinia sorghicola* Coq.) (Cecidomyiidae: Diptera)

The intensive and extensive cultivation and the introduction of new high yielding varieties of sorghum, though contributes to substantial increase in yield, have often resulted in the frequent outbreak of insect pests, particularly the midge, *Contarinia sorghicola* Coq. In India a brief account of the insect has been given by Felt (1921), Subramanian (1922), Kunhi Kannan (1926), Mani (1934) and Puttarudriah (1947). A detailed study on the biology of the insect on sorghum was taken up at the Agricultural College and Research Institute, Coimbatore during the year 1970-'71.

Paper bags (30 × 15 cm) were used to cover 100 newly emerged sorghum heads in the field. The bags were removed from ten heads daily in the morning for five consecutive days and the heads were exposed for 24 hours for midge oviposition. The duration of different stages was calculated by collecting and dissecting out the spikelets from the exposed earheads under the microscope daily in the morning. The measurement of all the stages was made. The remaining 50 bags were removed at one time, allowed for egg laying by the adults as before and covered once again. The total life cycle of the midge was calculated based on the time elapsed between head exposure and adult midge emergence. Observations on the natural enemies and the nature of damage were also made under field conditions.

Emergence, mating and oviposition: The maximum number of adults emerge early in the morning from 6.00 to 6.30 a. m. and mating takes place 30 minutes after emergence. The copulation lasts for about 10–12 seconds and mating takes place more than once. The pre-oviposition period ranges from 45 to 50 minutes. The peak level of oviposition occurs between 7.30 and 9.00 a. m. and the period of oviposition ranges from 10 to 12 hours. The female bends her abdomen, extends the flexible ovipositor and inserts the eggs into the spikelets. Mostly the eggs are laid deep into the spikelets on the palea very near the ovary. Sometimes it is laid on the lemma and rarely on the outer glumes or the stamens. The eggs are laid always singly and a maximum of six eggs are laid in a spikelet. Oviposition in majority of cases takes place while the spikelet is in bloom, particularly in the sessile bisexual spikelets with the anthers protruded out. Occasionally eggs are also laid in the staminate pedicellate spikelets but seldom on complete sterile spikelets. Egg laying is observed for 6–7 days in an ear-head. The total number of eggs laid by a single female varies from 98–110.

Egg: Egg is elongate with one end slightly broader than the other, yellow in colour with a reddish tinge. It is smooth and has a glistening surface

free from any sculptures or markings. Opposite to the micropilar end, it has a tail like viscous appendage which help for its attachment in the spikelet. The egg measures 0.35 to 0.40 mm in length and 0.075 to 0.1 mm in width. The incubation period is 2 days.

Larva: The newly hatched larvae reach the tender ovary and feed. The larva, immediately after hatching, is minute and colourless measuring 0.28 to 0.30 mm \times 0.08 to 0.1 mm. A full grown larva is dark orange to red in colour. It measures 2.25 to 2.30 mm \times 0.95 to 1.00 mm. The larval period ranges from 9 to 11 days. Generally two larvae are noticed in a spikelet though a maximum of five can be noticed at times.

Pupa: Pupation takes place very close to the ovary and the pupal stage is spent completely inside the spikelet itself. The pupa is covered by a silk case. In the early stage it is reddish orange but later turns red excepting the dark head, thorax, wing cases and legs. The length of the pupa varies from 2.25 to 2.40 mm and the breadth from 0.85 to 0.95 mm. The duration of the pupal period varies from 5 to 6 days.

A few minutes before emergence, the pupa wriggles up to the apex of the spikelet and protrudes out from the tip of the spikelet. The adult emerges leaving the dirty white empty pupal case protruding out. The entire life-cycle varies from 16 to 18 days.

Adult: The adult fly is very slender and small in size. The female is slightly bigger than the male and

measures 2.30 mm long and 0.56 mm broad. The antenna and legs are dark brown in colour. The head, thorax and the eyes are black while the wings are transparent. The halteres are prominent and yellowish. The abdomen in the case of the female is slightly enlarged and reddish orange in colour. The ovipositor is as long as the length of the body, minute and yellowish. The male is reddish brown in colour, the abdomen is slightly and characteristically curved with the two claspers. The longevity of the adult female is only 24 hours but that of the male ranges from 1.5 to 2 days.

Midge infestation in different seasons of the year: Sorghum is grown at Coimbatore both under rain-fed and irrigated conditions in the months of June-July and January-February. Due to continuous hybrid seed production and sorghum culture all the year round this pest also occurs throughout the year. But, the severity of infestation varies in different months. The peak incidence is noticed during October-November when favourable climatic conditions prevail.

The infestation on the main ear-heads varies from 18 to 27 per cent but on the ear-heads of the tillers it ranges from 92 to 99 per cent. Such an increased infestation in the ear-heads of tillers indicates clearly the magnitude of attack in a late flowering crop of sorghum.

Natural enemies: A Hymenopterous parasite *Tetrastichus* sp. parasitises the larvae. A Hemipteran

predator *Orius tantillus* was found to suck the body fluids of adult midges. The black ant *Camponotus compressus* was found to capture the adults while ovipositing and consume a large number of them.

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Role of Nitrogen on the Incidence of Ergot Disease of Pearl-Millet (*Pennisetum typhoides* [Burm. f.] Stapf and Hubb.)

Ergot disease caused by *Claviceps microcephala* (Wallr.) Tul. is one of the major diseases of pearl-millet (*Pennisetum typhoides* [Burm. f.] Stapf and Hubb.). This disease not only affects the yield, but also produces ergots, poisonous to both live-stock and human beings. The present study reports the influence of different levels of nitrogenous fertilizer on the occurrence of ergot disease on different hybrid varieties of pearl millet.

An experiment was conducted under field conditions with six levels

of nitrogen viz. 0, 40, 80, 120, 160 and 200 kg N per ha in the form of Urea and three hybrid varieties viz. HB. 3, J. 934 and J. 1270. The randomized block design was adopted with three replications on plots of 3.0 m × 2.7 m size. Urea was applied at equal split applications one at the time of sowing and the other four weeks after sowing. No manure either in the form of organic or inorganic was applied except the above scheduled doses of N. A spacing of 45cm × 15cm was adopted and one plant per hole