

SUMMARY AND CONCLUSION

The effects of phytochemicals and hormones (steroids and peptides) on the morphogenetic, physiological and biochemical indices in *Teleogryllus mitratus* were investigated.

Treatment of 48h old *T.mitratus* adult females with three fractions of neem seed extracts, kernel acetone extract, kernel methanol extract and pure azadirachtin elicit various effects. The crude neem kernel extracts produce developmental abnormalities like deformed wings and enhancement of nymphal period. The development of vitellogenic oocytes are also inhibited by the application of the kernel extracts.

For the biochemical evaluation, fat body, ovary and haemolymph were taken from the experimental and control insects and protein content was estimated. Both the crude extracts produce an inhibitory effect on general morphogenesis and oocyte development. Acetone and methanol extracts produce deformed wings and delay in nymphal- adult moulting. Maturation of oocyte is inhibited by the administration of these extracts. Vitellogenesis is also inhibited in maturing oocytes.

Effects of azadirachtin on intermediary metabolism of *T. mitratus* show a general inhibition of gluconeogenesis. The treatment of azadirachtin produce an inhibitory effect on the enzyme activities and triglyceride levels, but does not produce any effect in calcium levels.

Azadirachtin was injected to 48h old cricket and the ecdysteroid titre was studied. The ecdysteroids titres increase as the age advanced. The administration of azadirachtin lower the titre. The inhibitory effect was very significant in the experimental insects. In *T. mitratus*, azadirachtin acts as an inhibitor on vitellogenic oocyte development. The inhibitory effect was very significant in the experimental insects. The length of the oocytes of the experimental insects are considerably reduced when compared to the controls.

The second set of experiments demonstrate the effect of administration of two vertebrate steroids- estradiol 17 B and progesterone to 48h old adult female *T. mitratus*. Tissues like fat body, ovary and haemolymph were selected from the experimental and control insects for the biochemical evaluation of enzyme activities like AST and ALT and the levels of proteins at different age levels such as 48, 72, 96, 120 and 192h after the administration of the hormones. In hormone treated insects,

a decrease in the level of protein was observed demonstrating gluconeogenic effect of these steroids.

The third set of experiments revealed the effects of administration of a peptide hormone, human insulin. Fat body, ovary and haemolymph were selected from the experimental and control insects for the biochemical evaluation. The hormone was injected to the abdominal region of 48h old female insects. Biochemical estimation of protein and glycogen and the activities of transaminases and trehalase were assayed. An age dependent increase was observed in the biochemical constituents and enzyme activities. The administration of insulin enhances gluconeogenesis and proteogenesis an anabolic effect in *Teleogryllus*.

Administration of another mammalian hormone L-thyroxine to zero hour second wing nymph was done to study the effect of this hormone on the ovarian maturation and metamorphosis. Thyroxine accelerated ovarian maturation and metamorphosis by shortening the nymphal life span. Growth and maturation of vitellogenic oocytes were also enhanced by the administration of this hormone. Effect of thyroxine on the biochemical constituents of intermediary metabolism was also

studied. Thyroxine appears to be proteogenic and gluconeogenic in *Teleogryllus mitratus*.

To conclude, the neem extracts (crude and azadirachtin) are antigonadotropic, growth and neuroendocrine regulatory in *T mitratus*. So they could be used as effective growth regulators and moreover as effective pesticides. The presence of steroids in invertebrates is known. But their possible actions in insects are still obscure. The work done on *Teleogryllus* proved the regulatory effect of steroid hormones like estradiol and progesterone on the intermediary metabolism. Similarly the effect of peptide hormones like human insulin and L-thyroxine are not known till date. The results obtained by the administration these hormones in *Teleogryllus* showed evidences for the capability of these hormones to regulate the morphogenesis and intermediary metabolism in insects.

The investigations carried out in *Teleogryllus mitratus* is a beginning towards unravelling the multiple control of growth and metabolism of insects by hormones and phytochemicals. Receptor level studies are to be carried out to conclusively prove the specific site of action of phytochemicals and vertebrate hormones in insects. However, the present study

in *Teleogryllus* is a significant step to bridge the gap of information in insects, and is of considerable importance from the point of view of comparative endocrinology.