

## Isoprenoid metabolism in aphid : A new target for bioinsecticides development

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Aphids are important insect pests in temperate regions, damaging crop plants by sucking nutrients from the phloem and by transmitting plant viruses. Chemical control of certain aphid species is becoming extremely difficult due to resistance to insecticides. In this context, the development of novel pest control products that specifically target aphids is highly desirable. To this end, we decided to focus on aphid isoprenyl diphosphate synthases as potential bioinsecticide target sites. Short-chain *E*-IPPSs (scIPPS) are a class of prenyltransferases that are central to isoprenoid metabolism. This group includes geranyl diphosphate synthase, farnesyl diphosphate synthase and geranylgeranyl diphosphate synthase which synthesize geranyl diphosphate (C10), farnesyl diphosphate (C15), and geranylgeranyl diphosphate (C20), respectively. We cloned in aphid a previously uncharacterized type of scIPPS. Unlike others known scIPPS, the recombinant aphid enzyme displays a bifunctional activity, yielding the monoterpene precursor geranyl diphosphate as its principal product, along with significant quantities of the sesquiterpene precursor, farnesyl diphosphate. Both diphosphate precursors are presumed to play key roles in juvenile hormone, alarm and sexual pheromones biosynthesis in aphids. In an effort to provide a structural explanation for the bifunctional nature of the aphid enzyme, homology models of *Myzus persicae* and *Acyrtosiphon pisum* IPPSs were constructed using the avian x-ray structures. Several mutants were designed and then characterized for functional activity. We are striving currently to correlate enzymatic assays data and molecular dynamics analyses