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### Plants secondary metabolites for mosquito control

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Dear Editor:

Mosquito control lies in personal protection by using repellents and community education as the most economical method and application of eco–friendly larvicides for the control of mosquitoes. Synthetic insecticides are no doubt having quick actions but it received wide public concern for their adverse effects to the environment, like insecticide resistance<sup>[1]</sup>, environmental pollution, toxic hazards to human and other non–target organisms. To mitigate these problems, a major trend has recently appeared, which includes the use of natural plant based products as insecticides which can provide an alternate to synthetic chemical insecticides. Plants have secondary metabolites which are required for interaction with the environment and confirmed to have biological activity and that can be helpful in protecting the plants from a diseases and insect pests. These compounds can be divided into different chemical groups like alkaloids, phenolic, terpenoids, rare amino acids, plant amines and glycosides. These compounds also play an important role as anti–nutritional components of food and animal feed with a number of phenolic compounds. These include cell wall phenolic components, lignifications of cells and polyphenols such as condensed tannins. Plant also used these volatile terpenoids in plant–plant interactions and serve as attractants for pollinators. Soluble secondary compounds like cyanogenic glycosides isoflavonoids and alkaloids can also be toxic to animals. Plant terpenoids have been studied for their activities against a number of insects. Defense strategy of plant against insect pest and pathogens depends on the presence of volatile essential oils or monoterpenes. Due to presence of these compounds there are possibilities to search such plant extracts which can be effective against the mosquitoes. Many plants have been found to contain chemicals like

limonin and nomilin which are helpful for the control of insects and are useful for field applications in mosquito control programmes such as *Citrus cultivars*<sup>[2–4]</sup> and *Emblca officinalis*, *Ricinus communis*, *Acacia coucinna*, *Cinnamomum tejpata*, *Piper nigera*, *Coriandrum sativum*, *Olea vera*, *Linum usitatissimum*, *Syzygium aromaticum* and *Nigella sativa* have shown better insecticidal effects against *Aedes albopictus*<sup>[5]</sup>. There are many other plant extracts which are being used against different stages of mosquitoes.

Plant extracts and essential oils might be best alternative of synthetic insecticides for the control of disease vectors. However, further investigations are needed to determine the secondary metabolites of the effective plant extracts against mosquitoes for the development of new and safe insecticide. There is also need to develop such extraction methods which must be easy, understandable for the community and can be used at home level.

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