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Opinion

Role of Plant Growth Regulators in the Insect Pest Control: A Quick Outlook

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According to Environmental Protection Agency, a plant growth regulator (PGR) is defined as "any substance or mixtures of substances intended, through physiological action, to accelerate or retard the rate of growth or maturation or otherwise alter the behavior of plants [1,2]. As reported in the current literature, five principal categories of PGRs are recognized in plants: Auxins (Auxs), Gibberellins (GAs), Cytokinins (CKs), Ethylene (ET), and Abscisic acid (ABA). They are known to be produced in higher plants. In addition to these categories, two other categories appear to be active, in some cases, for regulating the plant growth: the brassinosteroids (BRs) and polyamines (POA) (Naqvi, 1994). Over 70 years, Aux, GAs, CKs, ABA and ET were considered as the main groups of phytohormones (for a review) [3]. Hopkins & Hüner [4] classified the plant hormones (or PGRs) into five classes: GAs, Auxs, ET, CKs, ABA and BRs. In their review, Ogunyale et al. [5] classified PGRs in five major classes: Auxs, CKs, GAs, ET and ABA.

According to the American Society for Horticultural Science, PGRs are classified in six major classes: Auxs, GAs, CKs, ET generators, growth inhibitors and growth retardants [6]. As reported by Morquecho-Contreras and Lopez [7], the classification of PGRs into traditional six groups which have been received a great research attention all over the world are Auxs, CKs, ET, ABA, GAs and BRs.

In the last four decades, many authors [7-11] suggested that the PGRs can be used as alternative to the conventional insecticides for controlling the economically dangerous insect pests. Synthetic PGRs mimic the authentic PGRs and are marketed specifically for the purpose of stimulation or retardation of plant growth and development. They are, also, used for reduction of the insect pest infestation on crop plants [12-15].

The available literature contains many reported works focusing on the disruptive effects of PGRs on various insect pests leading directly to death or through impairment of their reproductive potential and other physiological processes [16,17]. Also, many PGRs had been reported to deteriorate the food metabolism in different insects, through impairment of food ingestion, digestion, absorption and assimilation, such as Gibberellic acid against Bactrocera cucurbitae Spodoptera littoralis as well as JA against Spodoptera frugiperda [18].

The use of PGRs may be an effective tactic in IPM programs, since they induce the plant defenses resulting in decreased herbivore fitness [19-21]. However, the available literature has been enriched with many reported works indicating the stimulatory effects of PGRs on some plants to resist herbivorous insects through various defense strategies to minimize their damage [22-25].

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