

Plant Growth Regulators in Crop Production: Overview and New Developments

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Products based on approximately 40 active ingredients are currently applied as plant growth regulators (PGRs) in agriculture, horticulture and viticulture. Typically, PGRs are represented by plant hormones or their synthetic analogs, by inhibitors of hormone biosynthesis or translocation, and by hormone receptor blockers. Many plant processes can be actively regulated with PGRs, e.g. acceleration or delay of seed germination, stimulation or reduction of shoot elongation, induction of flowering and fruiting, reduction or increase of fruit set, acceleration or delay of senescence processes including fruit ripening and defoliation. The achieved benefits range from facilitating crop management to increasing and securing yield and quality of the harvested produce and improving its storage and shelf life. The most widely used PGRs are (i) inhibitors of gibberellin (GA) biosynthesis, which are of particular importance to reduce the risk of lodging in wheat, rice and other cereal species and in oilseed rape, (ii) the ethylene-releasing ethephon, which is, inter alia, used to accelerate fruit ripening, to induce uniform flowering and fruit formation in pineapples, to increase latex production in rubber trees, and to advance boll opening in cotton, and (iii) GA3, which is applied to improve fruit quality in seedless table grapes, citrus, pears, and other species.

Current global annual sales of PGRs are in the range of US\$ 1.4 billion, which represents approximately 2.5% of the crop protection market. Due to the relatively small market and high costs involved in finding, developing and registering new compounds, very few, if any, novel PGRs are expected to enter the market in the foreseeable future. The involved companies are rather concentrating on combining compounds already registered, improving formulations or finding additional uses for existing products.