Plant Growth Regulators — Backgrounds and Uses in Plant Production

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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 (a) 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, (b) the ethylene-releasing ethephon, which is, inter alia, used in different plant species to accelerate fruit ripening, in pineapples to induce uniform flowering, in rubber trees to increase latex production, and in cotton to advance boll opening, and (c) GAs, which is mainly applied to improve fruit quality in seedless table grapes, citrus, pears and other plant species. Current global annual sales of PGRs are in the range of US$ 1.2 billion, which represents approximately 2.5% of the crop protection market.