

Performance Plants Inc. Biotechnology Backgrounder

Performance Plants Inc. (PPI) is a global leader in agriculture and biofuel biotechnology based in Kingston, Ontario, with research facilities in Saskatoon, Saskatchewan and Waterloo, New York. As a leading agriculture biotech company, PPI's patented technologies weatherproof food crops against drought or excessive heat and it has the technological solution to produce cost-competitive feedstocks for the biofuel industry. The company has developed and holds over 100 global patents for breakthrough gene technologies that:

- enhance seed and flower yields by 26% in crops such as corn, canola and ornamentals (YPT®)
- protect crops against heat stress (HEAT™)
- enable plants to use available water more efficiently (WET™)
- increase biomass for biofuel feedstocks (BET™)
- enhance the conversion of plants cell walls into sugars (ECT™)

PPI's Technology Development Pipeline

Performance Plants consistently delivers leading next generation food and feed technologies through our unique and powerful trait identification process. Performance Plants has the capacity to identify the gene and then take the technology through to field trials.

- It begins by identifying desirable plant traits that would provide a solution for consumers, farmers or industry.
- Using advanced molecular screening tools, our scientists identify the specific modifications in a plant's gene that produce an improved trait.
- Crops with the improved trait are developed using one or more approaches including conventional breeding, marker-assisted selection and the application of biotechnology.
- Following detailed laboratory assessments, improved crops are tested under field conditions.

Yield Protection Technology® (YPT®)

YPT® is at the heart of PPI's suite of technologies, enabling plants to better tolerate drought conditions and to recover faster when watered. It was the first genetic enhancement identified and developed by PPI and will be commercially available by 2013. In five years of field trials, canola enhanced YPT® has shown yield increases of up to 26%. YPT® has also been successfully demonstrated in field-grown corn as well as in petunias where it increased flower number by 40%. YPT® has been licensed to some of the world's leading seed companies such as Bayer CropScience, Syngenta Biotechnology Inc., Stine Seeds Co., RiceTec Inc. and Scotts Miracle-Gro Co. The YPT® genetic enhancement enables plants to activate their natural



defences more aggressively against drought. Stomates are leaf pores that allow plants to grow through photosynthesis but also facilitate 90% of water loss. YPT® plants can close their stomates earlier and tighter in the drought cycle allowing plants to keep their moisture and health.

Heat Tolerance Technology (HEAT™)

HEAT™ is the first and only heat tolerance trait that protects plants from excessive heat, helping protect the world's food and biofuel supplies in an era of global warming. In controlled growth chamber experiments, HEAT™ plants have produced up to 23% higher yields when challenged with typical periods of hot growing conditions. This technology is currently being assessed in canola and other crop species. During hot seasons, each degree above a threshold causes 10-15% loss in seed yield for all major food crops. HEAT™ technology counters these losses by maintaining robust flower and seed development through periods of excessive heat stress.

Water Efficiency Technology™ (WET™)

PPI has developed a genetic trait technology that allows plants to grow with less water. Greenhouse experiments have shown that WET® plants produce 22% more growth with limited water. The Water Efficiency Technology™ (WET™) is ideal for crops that are rain-fed or grown with less than optimal irrigation. With the depletion of irrigation reservoirs and use of marginal lands for non-food biofuel crops, WET™ will be a critical trait to maximize productivity and reduce costs. Demonstrations of this technology in canola and other crops are currently underway.

Biomass Enhancement Technology™ (BET™)

PPI has developed a significant genetic enhancement known as Biomass Enhancement Technology™ (BET™). It is an ideal trait for biofuel crops as it has been shown to deliver 50% more biomass by boosting vegetative plant growth. Increasing biomass will yield more bales per acre and a significant reduction in the farmer's production cost, a key requirement for getting industry to switch to alternative, clean energy feedstocks.

Enhanced Conversion Technology™ (ECT™)

Making the plant's cell-wall sugars more easily converted to biofuel is crucial to creating biofuels. PPI's Enhanced Convertibility Trait™ (ECT™) resolves that dilemma. It does little good to have substantive biomass if the potential biofuel is so locked inside the plant's cell walls that extracting it is not cost-efficient. Studies with model plants have shown that certain ECT™ lines are almost twice as efficient in releasing fermentable sugars from biomass, showing potential to significantly reduce the cost of producing cellulosic biofuels.