

# 24<sup>TH</sup> BIOTECHNOLOGY CONGRESS: RESEARCH & INNOVATIONS

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### **Super high oleic safflower: Australia's new high value broad acre crop producing industrial grade plant-derived oil**

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Plant-derived oils are mixtures of saturated, monounsaturated and polyunsaturated fatty acids in ratios that are less than ideal for industrial uses that often demand high purity in feedstock composition. Large volumes of crude vegetable oil containing near-pure levels of oleic acid have long been considered a desirable industrial feedstock, offering unique physical and chemical properties for oleochemical purposes. Safflower (*Carthamus tinctorius* L.) seed produces oil that predominantly contain monounsaturated fatty acid (C18:1; oleic acid) and polyunsaturated fatty acid (C18:2; linoleic acid). While both have commercial uses, it is the valuable oleic acid that is used as a replacement to petroleum-based precursors in the manufacture of plastics, lubricants and cosmetics, etc. Traditional breeding programs have developed safflower seed with oleic acid levels in the range of 75–85%, and are the highest purity sources of oleic acid in any oilseed. However, like other oilseeds, the remaining linoleic acid component, at 12-18%, is not desirable for industrial use because it is unstable and difficult to remove during oil processing. Therefore, it is desirable to develop a safflower seed that accumulates high oleic acid (C18:1), but contains very low linoleic acid (C18:2) content. Two genetically modified safflower events were developed by the Commonwealth Scientific Industrial Research Organisation (CSIRO) and are being commercialized by GO Resources Pty Ltd. The events contain a construct designed to down-regulate two safflower fatty acid biosynthesis genes. Down-regulation is achieved using RNAi technology and is targeted to the seed using a seed-specific promoter. Down-regulation of the two safflower genes leads to accumulation of 92% oleic acid (C18:1) and very low (less than 2%) linoleic acid (C18:2) in the seed, Super High Oleic Acid Safflower Oil (SHOSO). Details of the development and commercialization of this new GM crop in Australia will be presented.

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