canopy®

Tech Note

Canopy® a unique, patented spray oil formulation.

Canopy® features a patented formulation built from an *n*C27 paraffinic oil for maximum insecticidal efficacy; a unique UV absorber additive that protects against phytotoxicity; and biodegradable, phyto-safe emulsifiers for superior leaf coverage and droplet retention.

Canopy was developed with cotton IPM specifically in mind, so all important spray oil properties were optimised to make the final formulation as effective as a spray oil can be.

The most important spray oil properties are base oil persistence and quality; emulsifier properties; and additive technology. Canopy's claims for insecticidal activity, low beneficial disruptive index, (BDI), insecticidal adjuvancy and low phytotoxicity risk are backed by data from replicated trials performed in typical Australian cotton growing conditions.[i,ii,iii]

Unlike some other spray oil products on the cotton market, these claims have not just been extrapolated from theory or assumed from the performance in other markets.

CANOPY FORMULATION DESIGN

BASE OIL PROPERTIES

Crude oil is a mixture of thousands of different types of molecules. The base oils used in spray oils are made of molecules that contain somewhere between about 17 and 35 carbon atoms (*n*C17 to *n*C35).

Within each molecule itself, a range of different types of carbon atoms can coexist, ranging from aromatics to ringed naphthenic groups to straight chain paraffins (Figure 1). Paraffinic groups that are branched are called isoparaffins. Modern refining processes remove almost all of the aromatics, by converting them to naphthenics.

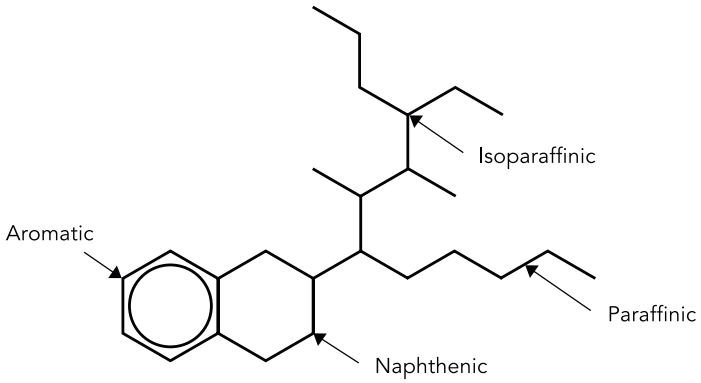
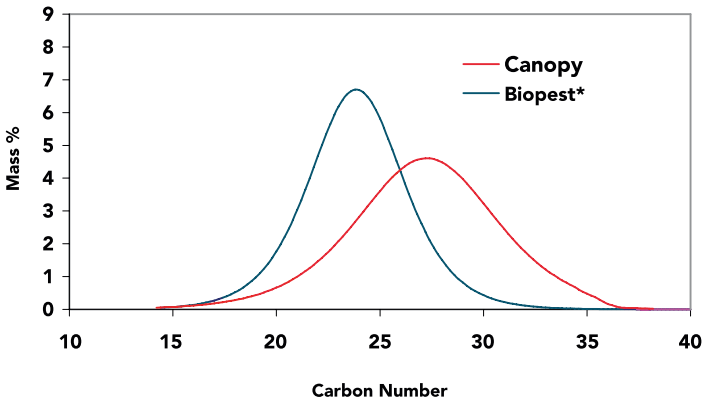


FIGURE 1 An *n*C26 oil molecule illustrating different types of carbon atoms.

OIL TYPE

When more than 60% of its atoms are paraffinic, an oil is classed as paraffinic. Biological evidence suggests that paraffinic oils have better efficacy than naphthenic oils because of their greater persistence on the leaf surface.[iv]

Canopy has a typical paraffinic content of about 70%, easily surpassing the criteria by which it can be classed as paraffinic.



*Biopest b/n G275
Method ASTM D2887 used.

FIGURE 2 Molecular size distribution of various spray oils.

OIL HEAVINESS

Heavier base oils contain larger molecules than light base oils. Heavy oils have a higher chance of covering pests through better lateral spread than light oils and have longer leaf surface persistence and therefore more chance of modifying pest behaviour.

Smaller molecules are lost more rapidly through volatilisation and absorption into cuticular tissue, and don't spread as far or persist as long as larger molecules. Spray oil efficacy is therefore directly related to the molecular size and this has been shown in replicated laboratory and field trials.[v]

Figure 2 illustrates the range of molecular sizes that are found in Canopy. Canopy, with a median molecular size of *n*C27, is shown to be far heavier than another spray oil used in cotton, SACOA Biopest, which is an *n*C24.

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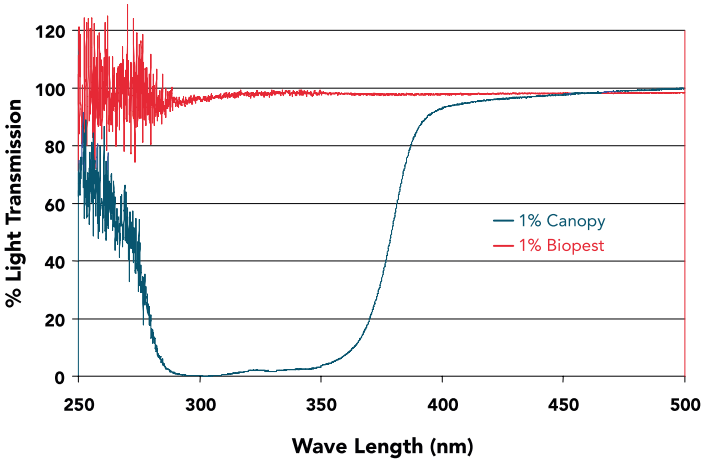
Being an *n*C27 paraffinic spray oil, Canopy is far heavier than other spray oils used in cotton explaining why Canopy controls green mirids and silverleaf whitefly and the others can't.



Biopest b/n tested: 055349B2 and G275

FIGURE 3 UV/Vis transmission spectra of spray oils v medicinal paraffin pharma.

%UNSULPHONATABLE RESIDUE (%UR)

%UR is the percentage of molecules of an oil that contain some aromatic atoms. 92% UR is the industry minimum standard. The higher the %UR, the fewer the aromatic atoms. Aromatic groups can absorb UV light which may start chemical reactions within the oil that eventually form acids. These acids can cause cellular damage to some plants.

UV Protection

Canopy contains a highly efficient, patented UV absorbing system. No other spray oil used in cotton contains a UV absorbing agent (refer to Figure 3). Because it absorbs UV light very efficiently in the solar wavelengths known to degrade biopesticides (300 to 400nm), Canopy can protect them from UV light.

With its high %UR (92) and highly UV protected formulation, Canopy presents no risk to cotton plants from sunlight degradation.

EMULSIFIERS

Emulsifiers can contribute significantly to the performance of a spray oil.[vi] Potential to cause phytotoxicity, ecotoxicity concerns, product shelf-life and tank-mix compatibility issues as well as oil-deposition, spreading and wetting properties must be considered when choosing emulsifiers for a spray oil.

PHYTOTOXICITY SCREENING

The emulsifiers used in Canopy were chosen after extensive research, screening and testing. Laboratory bioassays can be used to accurately screen potential emulsifiers for their tendency to cause phytotoxicity such as leaf burn and fruit drop.[vii]

Canopy presents no risk from this form of phytotoxicity.

References

i Mensah, R. and Liang, W. 2003. Evaluation of Caltex C27 Petroleum Spray Oils for Activity Against Helicoverpa spp. on Cotton Crops in Australia. A report prepared by NSW Agriculture, Australian Cotton Research Institute, Myall Vale, Narrabri, NSW.

ii Mensah, R. 2001. Phytotoxicity of Caltex Australia Petroleum Spray Oils and Adjuvants on Commercial Irrigated and Dryland Cotton Crops in Australia. A report prepared by NSW Agriculture, Australian Cotton Research Institute, Myall Vale, Narrabri, NSW.

iii Mensah, R. and Liang, W. 2002. Evaluation of Caltex Petroleum Spray Oil for Improving the Efficacy of Nuclear Polyhedrosis Virus (NPV) and Bacillus Thuringiensis (Bt) Against Helicoverpa spp. on Cotton Crops in Australia. A report prepared by NSW Agriculture, Australian Cotton Research Institute, Myall Vale, Narrabri, NSW.

iv Chapman, PJ. 1967. Petroleum Oils for the Control of Orchard Pests. New York State Agricultural Bulletin 814, 2/67.

v Liu ZM, Beattie GAC, Hodgkinson M, Rose HA, Jiang L. 2001 Influence of petroleum-derived spray oil aromaticity, equivalent n-paraffin carbon number and emulsifier concentration on oviposition by citrus leafminer, Phyllocnistis citrella Stainton (Lepidoptera: Gracillariidae). Australian Journal of Entomology 40: 193-7.

vi Hodgkinson MC, Johnson D, Smith G. 2001. Causes of phytotoxicity induced by petroleum derived spray oil. Spray Oils Beyond 2000 – Sustainable Pest and Disease Management, University of Western Sydney. 170-8.

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