



PRODUCT OVERVIEW - Part 1

EnSpray 99® Paraffinic Oil

Active Ingredient: 821g/L (980ml/L) mineral oil in the form of an emulsifiable concentrate. Unsulphonated Residue not less than 99.0% (typically 99.8%).

This data sheet provides a brief overview of **Grosafe** ENSPRAY 99 paraffinic oil. To support this important innovation in pest management **Grosafe** have also published a range of crop based leaflets that provide more extensive information on the safe and effective use of ENSPRAY 99. Please contact **Grosafe** for your copy.

ENSPRAY 99 is a highly refined biorational pesticide and pesticidal adjuvant that acts as:

- **A Fungicide:** Effective stand-alone fungicide across a range of crops (e.g. grapes)
- **An Insecticide:** Effective across a range of horticultural pests.
- **An Adjuvant:** A biological and chemical insecticidal carrier with unique sticking, spreading and UV protective features.
- **Behavior Modifier:** Deters feeding and/or oviposition (egg laying) behaviour of a range of key horticultural pests.

Suitable across a range of crops, pests and diseases, and spraying conditions.

With an unmatched level of purity ENSPRAY 99 represents the most advanced attempt yet to provide growers with a product capable of managing multiple, unrelated pests or diseases simultaneously.

Unmatched Product Quality

ENSPRAY 99 is a revolution in spray oil quality.

Produced from pharmaceutical/food-grade paraffinic oil ENSPRAY 99's clarity is a clear sign of it's quality and purity. In fact ENSPRAY 99's purity is the highest practical level achievable with current refining technology - over 99% (as defined by Unsulphonated Residue - USR- level).

Impurities are generally a grower's worst enemy when applying spray oils. Impurities, when exposed to sunlight, oxidise and form acids on the leaf surface and in certain climatic conditions 'burn' the plant and reduce growth and yield potential.

Why Does ENSPRAY 99 Work Better?

Here is why it works better.



Product Purity

ENSPRAY 99 has less than 1% impurities - the highest level practically achievable with current technology. Impurities cause damage and restrict growth the longer they stay on the plant surface. ENSPRAY 99's purity means it can stay on the plant surface and keep working without damaging the plant or restricting growth.

GROSAFE CHEMICALS LTD

20 Jean Batten Drive, Mt Maunganui, 3116
PO Box 14 450, Tauranga 3143, New Zealand

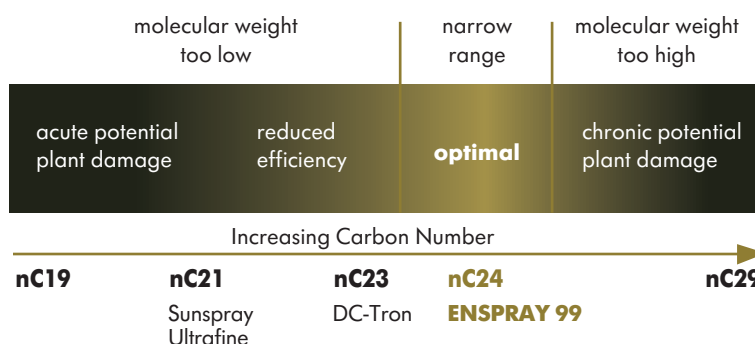
ph: +64 7 572 2662
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✓ Optimal Weight Oil

An oil's weight, or carbon number, influences its ability to stay on the plant surface. ENSPRAY 99's weight is **nC24** (illustrated below), which is regarded as the optimal weight for an oil when used in pest management.



Because ENSPRAY 99 persists on the leaf surface longer it means:

- More pests killed.
- Significantly greater effectiveness in modifying the behaviour of pests.

✓ Super Sticking

ENSPRAY 99's superior rainfastness means it will keep the insecticide on the plant longer - allowing more time for pest control for both the insecticide and ENSPRAY 99.

✓ Super Spreader

ENSPRAY 99 contains a unique surfactant formulation that provides for superior spreading of spray droplets. This means more pests come into contact with the spray.

What makes ENSPRAY 99 a Biorational Pesticide?

ENSPRAY 99 provides a number of unique features that make it an important tool for IPM (Integrated Pest Management) and sustainable farming. These features are:

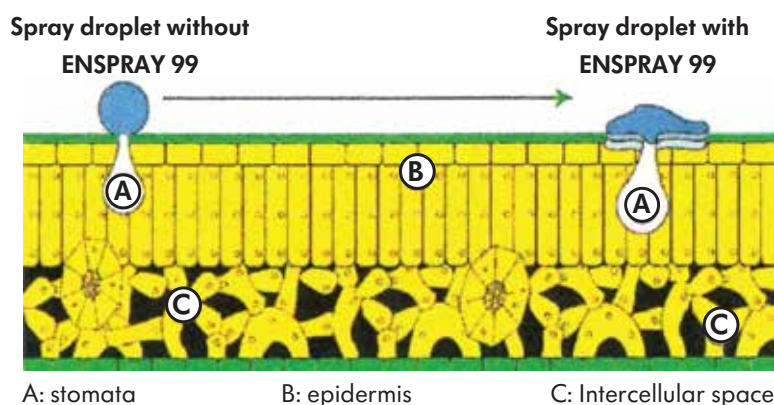
- **NO PEST RESISTANCE:** Pests will not develop resistance to ENSPRAY 99. This fact is supported by 100 years of research.
- **SAFE TO BENEFICIALS:** ENSPRAY 99 causes minimal harm or disruption to beneficials. This is due to the way ENSPRAY 99 acts on pests.
- **PEST/DISEASES MANAGEMENT:** ENSPRAY 99 will act as a stand alone manager of a wide range of horticultural pests and diseases.
- **INSECTICIDE CARRIER:** ENSPRAY 99 will act as a uniquely effective carrier with most chemical insecticides as well as Bt's/NPV's.



- **REDUCED COSTS:** Independent research shows ENSPRAY 99 can significantly reduce insecticide and pest management costs.
- **PROTECT YIELD:** Independent research has shown that ENSPRAY 99's 'soft' approach to insect management won't sacrifice crop yields.
- **ENVIRONMENTAL IMPACT:** ENSPRAY 99 is broken down within weeks to form simple molecules that do not pose a threat to the environment.

The Case Against Vegetable and Lesser-Grade Oils

Lesser quality petroleum oils and vegetable oils have been shown to damage plants, affect growth and reduce yields in other crops. It is thought this is primarily caused by the lower quality of the oils as well as their different chemical make-up.



These oil types are also less likely to provide insecticidal qualities, particularly in terms of behaviour modification.

REGISTERED APPLICATIONS

Potential applications for ENSPRAY 99 are extensive, covering grapes, citrus, avocados, kiwifruit and other horticultural crops. Please refer to ENSPRAY 99's product label for complete listing of registered applications. A copy is available at **Grosafe** Chemicals Ltd.

PRODUCT USES

The regular presence of ENSPRAY 99 in the crop or orchard provides a two-pronged pest management approach.

1. **PEST KILL:** Each spray will kill pests rapidly without disrupting the beneficial insects.
2. **PEST MANAGEMENT:** The presence of ENSPRAY 99 will additionally deter egg laying and feeding in the crop by many key pests for up to 10 days.

Some important principles apply when using ENSPRAY 99. These are discussed in the following sections.

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20 Jean Batten Drive, Mt Maunganui, 3116
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A Proactive Approach

Proactive spraying is essential to IPM programs and when using ENSPRAY 99. Set pest thresholds, monitor and spray when necessary. This will avoid the expense of having to manage high or extreme pest levels.

Six Application Principles

- High water volumes
- Rates of between 0.5% - 2%
- Ideally, use multiple applications, 10 days apart
- Ensure thorough coverage of the plant
- Constant agitation in the tank
- Avoid spraying when plants are stressed

Action Modes of EnSpray 99®

ENSPRAY 99 is very effective for controlling certain mites, insects and fungal diseases when used alone or as an adjuvant for certain pesticides.

Spray Oil Emulsion

Quick - breakable oil in water emulsion.



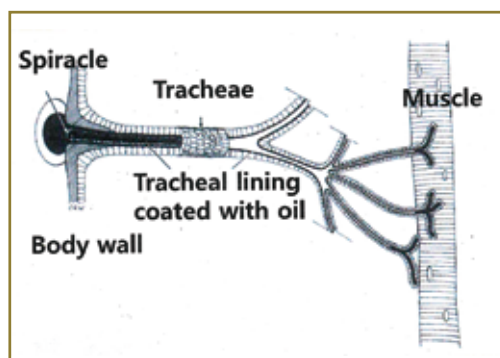
Insecticide Action

Suffocation - Anoxia or suffocation. Also reduces metabolism.

Oil spray alone has been demonstrated to be effective in controlling a wide range of pests, such as scales, thrips, whiteflies, aphids and mites. ENSPRAY 99 inhibits insect and mite breathing resulting in suffocation.

Traditionally, petroleum spray oil has been used in agriculture and horticulture as a contact pesticide to suffocate eggs, immature and adult stages of pests.

When applied, oil can move into aeropyxles of eggs and the spiracles and tracheae of larvae, nymphs and adults by capillary action resulting in asphyxiation. This mode of action is through direct contact.



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Insecticide Action

Behaviour Modification - Anti-feeding, Anti-oviposition

ENSPRAY 99 can also affect feeding and oviposition activity by interfering with a pest's ability to detect host plants. Usually, phytophagous insects and mites will only feed and lay eggs on specific plants (host plants) after their sensory organs located on their antennae, mouthparts, feet or abdomen detect specific chemicals of host plants. When oil droplets block the sensory organs, it prevents the insects from receiving the stimulus from the host plants. When the feeding pests fail to identify their host plant, they will avoid feeding and laying eggs. ENSPRAY 99 protects the plant from feeding damage and reduces the population density. Oil has been found to affect the feeding and egg-laying behaviour of leafminers, thrips, whiteflies and mites.

Fungicide Action

- Suffocates pathogen
- Prevents fungi agglutination to the host
- Prevents sporulation and decreases lesion adhesion, as a preventative and curative
- Prevents infection

ENSPRAY 99 works as a suffocant to control fungi by interfering with respiration. It also interferes with the attachment of the pathogen to its host plant. ENSPRAY 99 not only controls fungi but also prevents inoculation and infection (protective), suppresses infection before it becomes visible (pre-lesion), deactivates a visible infection (post-lesion) and suppresses sporulation. ENSPRAY 99 has demonstrated broad-spectrum activity against many fungi such as powdery mildew, greasy spot, sooty mold, rust and Botrytis.

Adjuvant Action

ENSPRAY 99 has a synergistic effect when mixed with most pesticides by protecting them from breakdown, increasing their translocation (efficacies), enhancing cuticular penetration of pests and increasing residual activity (chemical residue will last longer on plant surface). It also reduces evaporation and spray drift. It can increase the adherence and spreading by reducing surface tension.

PRODUCT OVERVIEW - Part 2

EnSpray 99® Paraffinic Oil

ENSPRAY 99 is a highly refined pharmaceutical/food-grade iso-paraffinic oil formulation designed for use as a fungicide, insecticide, to manage certain aphid-transmitted viruses and as a premium carrier/adjuvant. With an unmatched level of purity ENSPRAY 99 represents the most advanced attempt yet to provide growers with an IPM product capable of controlling multiple, unrelated pests and fungal diseases simultaneously.

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An Essential Integrated Pest Management (IPM) Solution

ENSPRAY 99 is an essential IPM solution that offers the following features:

- Proven effectiveness in pest control.
- Simultaneous control of a number of pests and diseases.
- No pest resistance.
- Ability to modify pest behaviour.
- Minimal impact on beneficial insects.
- Not persistent in the environment.
- Low toxicity to animals & handlers.
- Safe to handle.
- Won't stimulate pest outbreaks.

ENSPRAY 99 Certified for organic Farming

After an extensive process of analysis and audits of all ingredients including the manufacturing and packing process, ENSPRAY 99 has received registration for use in organic farming for New Zealand Agriculture covering Broad Acre, Viticulture and Horticulture. **Grosafe** Chemicals assists in environmentally sound and sustainable farming techniques.

ENSPRAY 99's Role In IPM Programs

ENSPRAY 99 is a valuable tool in the practice of IPM & there exists "significant new potential for using petroleum spray oils in horticulture & broadacre agriculture" (Beattie et al, 2000).

This potential is well recognised & research commitments are being made on the strength of this potential by commercial groups such as **Grosafe** & other leading research institutions in New Zealand and overseas.

ENSPRAY 99, as an advanced biorational pesticide and adjuvant, is a uniquely safe and effective IPM solution due to:

Uniquely Safe

- A 99%+ pure formulation.
- Produced from pharmaceutical and food grade base oil.
- Biodegradable.
- Safe to handle.
- No toxic potential.
- 24hour pre-harvest interval.
- Minimal impact on beneficial insects.

Uniquely Effective

- Unique formulation.
- High paraffinic content (74%).
- Proven control of a range of fungal diseases and pests.
- Maximises plant coverage and rainfastness.
- Shown to assist UV-sensitive chemistry.
- Stable emulsion.
- No pest resistance will develop.
- Ability to modify pest behaviour.
- Won't stimulate pest outbreaks.
- Proven performance in commercial crops such as apples, avacados, citrus, grapes and kiwifruit.

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