

Using Trichogramma in cotton IPM programs



Research into the use of Trichogramma in cotton is ongoing. Below are typical questions asked and our recommendations based on current knowledge.

Why Trichogramma wasps?

Trichogramma pretiosum although a tiny wasp is a very aggressive parasitoid and can increase to very high numbers resulting in near to 100% parasitism in favourable conditions. Trichogramma activity enables reductions in chemical applications and reduces resistance pressures on those products. Inoculative releases early in the life of a crop are recommended. In this way, release rates can be relatively low and the wasps do not need to be evenly distributed through the crop - reducing the application time and cost. This method uses the natural increase in wasp numbers within the crop over several generations. Typically 3 wasps emerge from each parasitised egg and in hot conditions the generation time is only 8 days. This high reproductive rate enables huge numbers of wasps to develop rapidly. In some cases this will happen even without releases but it is typically much slower than desired. In many districts, cold winters combined with limited plant growth result in low numbers of overwintering wasps. However, this process can be made much more reliable and speeded up by the mass release of Trichogramma.

Which crops are suitable?

InGuard[®] crops are particularly suitable as spraying for heliothis is greatly reduced in the early stages. This provides an opportunity for Trichogramma to multiply and spread with minimal disruption. Under these circumstances, a relatively low release rate of 100,000 per ha may be sufficient - given there are good numbers of heliothis eggs at the time of release.

Conventional crops are not ruled out but it is desirable to also release into suitable adjacent crops like sorghum and maize. The wasp numbers increase and then migrate into the cotton in high numbers. If spraying is then required in the cotton, wasp numbers are likely to be higher and the adjacent crops continue to act as a refuge and source of wasps.

When to release?

Adjacent crops:

Releases can be made into more developed crops adjacent to just planted cotton if they are present. Release when eggs are relatively easy to find - in sorghum this is typically approaching flowering and in maize as tassels emerge through to early silk.

Directly into cotton:

Releases can be made as soon as eggs are found in low numbers - 1 egg per meter is enough. If releases are made two weeks running there is more chance of catching an egg lay and it will also result in a more even generational distribution in the wasp population.

How to release?

There are various release methods available depending on the size of the area to be treated.

Method	Area suitable	Comments
Capsules	To 20 hectares	Capsules are easy to use, no set up but best stapled to leaf.
Loose eggs in liquid Hand operated doser	10 to 50 hectares	Hand doser can be operated from bike or 4 wheeler
Loose eggs in liquid Auto mechanised doser	50+ hectares	Mechanical doser can be fitted to 4-wheeler, cultivator or spray boom

Capsules are supplied in sheets of 60 capsules — each capsule yields over 1,000 wasps.

Loose parasitised eggs are supplied by the gram- there are over 50,000 eggs per gram.

The eggs are mixed into water with a special thickener added to keep them in suspension.

How many to release?

Capsules: Two releases a week apart of 60 capsules per ha are recommended. If egg pressure is high at the time of release, make one release of 120 capsules per ha. Capsules can be laid out in rows about 20 meters apart so that 500 meters are traveled per hectare.

Loose eggs in aqueous solution: Two releases a week apart of 2 grams per hectare. Dosed in bands through the crop.

What to expect?

Typically, spray decisions have been based on numbers of eggs and larvae per meter of row. When *Trichogramma* are active it is important to base decision making on the numbers of larvae and viable or unparasitised eggs per meter. Eggs can be collected and grown out to determine parasitism rates.

Parasitism after the 1st week is likely to be low, 10% to 30%. After the 2nd generation this is likely to increase to around 50% and (if egg pressure is good) in the 3rd generation to high levels. The more eggs laid in the crop, the more the wasps can breed. Even 10 eggs per meter translates to around 100,000 eggs per hectare. So, if half of these eggs are parasitised then the numbers of wasps emerging from those eggs will be around 150,000 per hectare. When wasp numbers reach such levels, parasitism rates can be very high even under heavy pressure.

Some conditions will reduce *Trichogramma* activity so it is important to be aware of these:

- several days of extreme heat, especially if the crop is water stressed and the air is dry.
- several days of wet weather will reduce adult wasp activity.
- periods of very low egg pressure.
- incompatible chemical applications.
- high predator counts may reduce the number of parasitised eggs yielding wasps.

Which chemicals can be used?

Many chemicals are hazardous to *Trichogramma* but fortunately, there are a number of products available which are either safe or relative safe to use with *Trichogramma*.

Product	Trade names	Toxicity to <i>Trichogramma</i>	
		Applied	Residual*
Bt products	Dipel	nil	nil
NPV products	Gemstar, Vivus	nil	nil
Indoxycarb	Steward	low	3 days
Methoxyfenoxide	Prodigee	low	3 days
Spinosad	Tracer	moderate	7 days

*time to wait before releasing *Trichogramma*

Select the softest option if the number of larvae or unparasitised eggs exceeds your threshold. Also be aware that the higher the number of parasitised eggs per hectare the more robust will be the wasp population and the quicker they will recover from spraying of a moderately hazardous product. Adult wasps may be killed but wasps developing inside eggs are protected to some degree. Conversely, low numbers of heliothis will only support a low population of wasps so using hazardous insecticides during such periods will severely effect wasp numbers.

Trichogramma pretiosum are produced by **Bugs for Bugs** Mundubbera Qld.

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