

Parasitoids and Predators maintained at ICAR- NBAIR, Bengaluru

Biocontrol Agent	Stage supplied	Systematic position	Target pest	Recommended dosage	No. of releases recommended	
PARASITOIDS						
<i>Trichogramma chilonis</i> Ishii (I) #	Parasitised egg cards	Hymenoptera: Trichogrammatidae	Sugarcane borers <i>Chilo infuscatellus</i> , <i>Chilo sacchariphagus indicus</i> , <i>Chilo auricilius</i> , <i>Acigona steniellus</i> ;	50,000/ha on sugarcane and vegetables; 100,000/ha on maize and 1,50,000/ha on cotton	Sugarcane: 4 to 6 releases at 10 days intervals for early shoot borer; 8 to 10 releases for stalk, internode and Gurdaspur borers Cotton (Non Bt) & Vegetables: Six weekly releases Maize: Three releases at five days intervals	
			Cotton (Non Bt) bollworms <i>Helicoverpa armigera</i> , <i>Pectinophora gossypiella</i> & <i>Earias</i> spp.;			
			Maize stem borer <i>Chilo partellus</i> ,			
			Diamond back moth <i>Plutella xylostella</i> ;			
			Tomato fruit borer <i>Helicoverpa armigera</i>			
<i>Trichogramma japonicum</i> (I)	Parasitised egg cards	Hymenoptera: Trichogrammatidae	Top shoot borer of sugarcane <i>Scirpophaga excerptalis</i> and Paddy stem borer <i>Scirpophaga incertulas</i>	Sugarcane & Paddy: 50,000/ha		Sugarcane: 4 to 6 releases at 10 days intervals on observing pest or from 60th day Paddy: 6 releases on appearance of pest or from 30th day after

				transplantation
--	--	--	--	------------------------

<i>Trichogramma chaca</i>(I)*	Parasitised egg cards	Hymenoptera: Trichogrammatidae	Cotton (Non Bt) bollworms and Bhendi Borer	1,50,000/ha on cotton (Non Bt) 50,000/ha on vegetables	Six releases at weekly intervals
<i>Trichogramma pretiosum</i>(E)*	Parasitised egg cards	Hymenoptera: Trichogrammatidae	Tomato fruit borer <i>Helicoverpa armigera</i>	50,000/ha	Six releases at weekly intervals on appearance of pest or from 45th day from transplanted
<i>Trichogramma embryophagum</i>(E)*	Parasitised egg cards	Hymenoptera: Trichogrammatidae	Apple Codling moth <i>Cydia pomonella</i>	2000 adults per tree or 100,000/ha	Releases starting from the first moth catch, continue at weekly intervals till pest egg availability in the field
<i>Trichogramma dendrolimi</i>Matsumura (E)*	Parasitised egg cards	Hymenoptera: Trichogrammatidae	Targeted against tissue borers on maize and sugarcane – For Researchwork	-	-
<i>Trichogramma brassicae</i>(E)*	Parasitised egg cards	Hymenoptera: Trichogrammatidae	Diamondback moth <i>Plutella maculipennis</i> and Cabbage butterfly <i>Pieris brassicae</i> on cabbage and cauliflower	100,000/ha	Six releases at weekly intervals

<i>Trichogrammaevanescens</i>Westwood	Parasitised egg cards	Hymenoptera: Trichogrammatidae	Targeted against tissue borers on maize and sugarcane - For Researchwork	-	-
<i>Trichogrammamwanzai</i>(E)*	Parasitised egg cards	Hymenoptera: Trichogrammatidae	Targeted against <i>Helicoverpa armigera</i> - For Research work	-	-

<i>Trichogrammatoid earmigera</i>(E)*	Parasitised egg cards	Hymenoptera: Trichogrammatidae	Targeted against <i>Helicoverpa armigera</i> - For Researchwork	-	-
<i>Trichogrammatoid eabactrae</i>(E)*	Parasitised egg cards	Hymenoptera: Trichogrammatidae	Diamond back moth <i>Plutellaxylostella</i> on cabbage	2,50,000/ha	Five releases at weekly intervals
<i>Telenomusremus</i> Nixon (E)	Parasitised egg cards	Hymenoptera: Scelionidae	Tobacco caterpillar <i>Spodoptera litura</i>	1 lakh /ha	Three to four releases
<i>Goniozusnephantidis</i> (Muesebeck) (I)	Cocoons	Hymenoptera: Bethyidae	Coconut black-headed caterpillar <i>Opisina arenosella</i>	10 adults per palm	Four releases
<i>Chelonusblackburnii</i> Cameron (E)*	Adults	Hymenoptera: Braconidae	Potato tuber moth <i>Phthorimaea perculella</i>	50000 adults /ha in the field 2 adults per kg of potatoes in godowns	Two releases at weekly intervals Three to four releases (or as per need) at fortnightly intervals

*Only Nucleus culture will be supplied, either for research work or for further scaling up for commercialization #
Sugarcane, Cotton and Vegetable strains of *T. chilonis* maintained;
I: Indigenous; E: Exotic

Biocontrol Agent	Stage supplied	Systematic position	Target pest	Recommended dosage	No. of releases recommended
PREDATORS					
<i>Cryptolaemus montrouzieri</i> Mulsant (E)	Adults / Grubs	Coleoptera: Coccinellidae	Mealy bugs <i>Maconellicoccus hirsutus</i> , <i>Planococcus citri</i> , <i>P. lilacinus</i>	10 beetles or 50 grubs /infested plant or tree or 5000 beetles/ha	One or more releases based on pest intensity
<i>Scymnus coccivora</i> (Ramakrishna Ayyar) (I)	Adults	Coleoptera: Coccinellidae	Mealy bugs on citrus, grapes and other fruit crops (<i>M. hirsutus</i> , <i>Planococcus</i> spp.)	600 – 2500 adults/ha	One or more releases based on pest intensity
<i>Chilocorus nigrita</i> (Fabricius) (I)	Adults / Eggs	Coleoptera: Coccinellidae	Sugarcane scale insect <i>Melanaspis glomerata</i> Citrus scale <i>Aonidiella aurantii</i>	1500 beetles/ha; or 10 egg pads (with 40 eggs per pad) in 100 spots/ha (40,000 eggs/ha) 10 adults/tree	One or more releases based on pest intensity
<i>Cheilomena sexmaculata</i> Fabricius (I) *	Adults / Eggs	Coleoptera: Coccinellidae	<i>Aphis craccivora</i> on legumes and <i>Lipaphis erysimi</i> on oilseed crops	5000 larvae or 500 adults per ha	Two releases; first release to coincide with the appearance of aphids
<i>Coccinella septempunctata</i> Linnaeus (I) *	Adults / Eggs	Coleoptera: Coccinellidae	<i>Aphis craccivora</i> on legumes and <i>Lipaphis erysimi</i> on oilseed crops	5000 larvae or 500 adults per ha	Two releases; first release to coincide with the appearance of aphids
<i>Brumoides suturalis</i> (Fabricius) (I) *	Adults	Coleoptera: Coccinellidae	Aphids and white flies	-	-
<i>Curinus coeruleus</i> Mulsant (E)	Adults	Coleoptera: Coccinellidae	Subabul psyllid <i>Heteropsyllacubana</i>	20 Adults per tree	Two releases during July and October

<i>Chrysoperlacarnea</i> (Stephens) (I)	Eggs / First instar larvae	Neuroptera: Chrysopidae	Sucking pests on cotton, tobacco, sunflower, groundnut & some fruit crops	10,000 first instar larvae/ha	Twice during the season with an interval of 15 days On fruit crops, 10 – 20 larvae per infested tree
<i>Malladaspp.</i> (I) *	Cocoons	Coleoptera: Coccinellidae	Sucking pests on cotton, tobacco, sunflower, groundnut & some fruit crops	10,000 first instar larvae/ha	Twice during the season with an interval of 15 days On fruit crops, 10 – 20 larvae per infested tree
<i>Ischiodonscutellaris</i> (Fabricius) (I) *	Cocoons	Diptera: Syrphidae	<i>Aphis craccivora</i> on legumes and <i>Lipaphis erysi</i> on oilseed crops	5000 larvae/ha	-
<i>Micromustimidus</i> (Hagen) (I) *	Larvae	Neuroptera: Hemeroibiidae	<i>A. craccivora</i> on legumes & oilseeds & Sugarcane Woolly Aphid	Research in progress	Research in progress
<i>Cardiastethus exiguus</i> Poppius (I)	Adults/Nymphs	Hemiptera: Anthocoridae	<i>Opisina arenosella</i> Coconut black-headed caterpillar	50 nymphs/adults per tree	Three releases
<i>Blaptostethus pallescens</i> Poppius (I)	Adults/Nymphs	Hemiptera: Anthocoridae	Spider mites on bhendi	5 to 10 nymphs per plant	Five releases
<i>Xylocoris flavipes</i> (Reuter) (I) *	Adults/Nymphs	Hemiptera: Anthocoridae	Storage pests	For research work	-
<i>Orius antillensis / Orius maxidentis</i> (I) *	Adults/Nymphs	Hemiptera: Anthocoridae	Thrips	For research work	-

*Only Nucleus culture will be supplied, either for research work or for further scaling up for commercialisation: I: Indigenous; E: Exotic

Exotic <i>Trichogrammaspp.</i> from France with <i>Wolbachia</i> for Research purpose (Lab reared on <i>Sitotrogacerealella</i> source)			
<i>Trichogrammacacaeciae</i> Marchal (E)*	Parasitised eggs	Hymenoptera: Trichogrammatidae	For research work
<i>Trichogrammacordubensis</i> Vargas and Cabello (E)*	Parasitised eggs	Hymenoptera: Trichogrammatidae	For research work
<i>Trichogrammaembryophagum</i> (Hartig) (E)*	Parasitised eggs	Hymenoptera: Trichogrammatidae	For research work
<i>Trichogrammaevanescens</i> Westwood (E)*	Parasitised eggs	Hymenoptera: Trichogrammatidae	For research work
<i>Trichogrammapretiosum</i> Riley (E)*	Parasitised eggs	Hymenoptera: Trichogrammatidae	For research work
<i>Trichogrammasemlidis</i> (Aurivillius)(E)*	Parasitised eggs	Hymenoptera: Trichogrammatidae	For research work
<i>Trichogrammabrasiliense</i> (Ashmead) (E)*	Parasitised eggs	Hymenoptera: Trichogrammatidae	For research work

*Only Nucleus culture will be supplied, either for research work or for further scaling up for commercialization E: Exotic

<i>Trichogrammaspp.</i> & <i>Uscanaspp.</i> maintained in the Bio-systematics Laboratory – All indigenous		
Species	Locality of collection	Host insect / plant on which Collected
<i>Trichogrammaachaeae</i> Nagaraja & Nagarkatti	Tumkur and Saligrama strains	-
<i>Trichogrammadanausida</i> Nagaraja	Local, Aligarh, and Hesaraghatta strains	Ex. <i>Catopsiliapyrantheon</i> <i>Cassia Fistula</i>
<i>Trichogrammasemlidis</i> (Aurivillius)	Nr. Hesaraghatta	Ex. Tabanid eggs on paddy leaves
<i>Trichogrammasp. nr. cuttackensis</i> Nagaraja	Someshwar, Udupi dt.	Ex. Sciomyzid eggs on paddy leaves
<i>Trichogrammasp. n.</i> (being described)	Balehonnur	Ex. Unidentified pierid eggs (? <i>Catopsiliapyranthe</i>)
<i>Trichogrammaflandersi</i> Nagaraja & Nagarkatti	Mandya	Ex. Eggs of <i>Chilo infuscatellus</i> on young sugarcane
<i>Trichogrammachilotraeae</i> Nagaraja & Nagarkatti	Bijwara	Ex. Eggs of <i>Lampides boeticus</i> on <i>Cajanus cajan</i>
<i>Trichogrammatoideabactrae</i> Nagaraja	Hesaraghatta	Ex. eggs of <i>L. boeticus</i> on <i>Crotolaria mucronata</i>
<i>Trichogrammatoidea nana</i> (Zehntner)	Hesaraghatta	Ex. Unidentified lepidopterous eggs on <i>Cassia auriculata</i>
<i>Trichogrammatoidea fulva</i> Nagaraja	Chikkaballapur	Ex. Eggs of <i>Cryptophlebia ombrodelta</i> on tamarind pods
<i>Trichogrammatoidea sp. nr. Fulva</i>		Ex. Unidentified lepidopterous eggs on <i>Cassia auriculata</i>
<i>Trichogrammatoidea armigera</i> Manjunath	Hesaraghatta	Ex. Eggs of <i>Lampides boeticus</i> on <i>C. mucronata</i>

<i>Trichogrammatoideasp. nr. armigera</i>	Hessaraghatta	Ex. Eggs of <i>L. boeticus</i> on <i>C. mucronata</i>
<i>Trichogrammatoidearobusta</i> Nagaraja	Hessaraghatta	Ex. Eggs of <i>L. boeticus</i> on <i>C. mucronata</i>
<i>Trichogrammatoideasp. nr. robusta</i>	Hessaraghatta	Ex. Eggs of unidentified lepidopteran on pods of <i>C. auriculata</i>
<i>Uscanafemoralis</i> Pajni	Hessaraghatta	Ex. Bruchid eggs on dry pods of <i>C. auriculata</i>
<i>Uscanasp. no. 1</i>	Hessaraghatta	Ex. Bruchid eggs on pods of <i>C. auriculata</i>
<i>Uscanasp. no. 2</i>	Bijwara	Ex. Bruchid eggs on tamarind pod