

Table S1. Biological assets registered and used to control insects and diseases and their respective dosage per hectare according to the biological target.

Active ingredient	Biological Targets	Dosage per hectare
<i>Beauveria bassiana</i> , R444	Whitefly (<i>Bemisia tabaci</i> , biotipo B)	50 to 200 g/ha
	The coffee berry borers (<i>Hypothenemus hampei</i>)	400 to 500 g/ha
	Two-spotted spider mite (<i>Tetranychus urticae</i>)	100 to 300 g/ha
	Maize leafhopper (<i>Dalbulus maidis</i>)	200 to 500 g/ha
<i>Beauveria bassiana</i> , GHA	Whitefly (<i>Bemisia tabaci</i>)	75 to 125 g/ha
	Banana borer (<i>Cosmopolites sordidus</i>)	5g/bait
	Maize leafhopper (<i>Dalbulus maidis</i>)	750 to 1250 g/ha
	The Asian citrus psyllid (<i>Diaphorina citri</i>)	500 to 1000 g/ha
	The eucalyptus snout beetle (<i>Gonipterus scutellatus</i>)	75 to 125 g/ha
	The coffee berry borers (<i>Hypothenemus hampei</i>)	100 to 500 g/ha
	Two-spotted spider mite (<i>Tetranychus urticae</i>)	100 to 250 g/ha
<i>Beauveria bassiana</i> , PL 63	The thrips (<i>Thrips tabaci</i>)	500 to 1000 g/ha
	The coffee berry borers (<i>Hypothenemus hampei</i>)	0.5 to 0.9 Kg/ha
	The neotropical brown stink bug (<i>Euschistus heros</i>)	0.75 to 3.0 Kg/ha
<i>Beauveria bassiana</i> , CG 716	Whitefly (<i>Bemisia tabaci</i>)	0.3 to 1.2 Kg/ha
	The coffee berry borers (<i>Hypothenemus hampei</i>)	0.5 to 1.5 L/ha
	The Asian citrus psyllid (<i>Diaphorina citri</i>)	0.5 to 2.0 L/ha
<i>Beauveria bassiana</i> , BV13	Yerba mate borer (<i>Hedypathes betulinus</i>)	1.0 L/ha
	The coffee berry borers (<i>Hypothenemus hampei</i>)	0.5 to 2.0 L/ha
	Maize leafhopper (<i>Dalbulus maidis</i>)	0.25 to 2.0 L/ha
	Whitefly (<i>Bemisia tabaci</i> biótipo B)	0.5 to 2.0 L/ha
	Two-spotted spider mite (<i>Tetranychus urticae</i>)	0.25 to 2.0 L/ha
	Cotton boll weevil (<i>Anthonomus grandis</i>)	0.5 to 2.0 L/ha
	White cochineal (<i>Planococcus citri</i>)	1.0 to 2.0 L/ha
	The fall armyworm (<i>Spodoptera frugiperda</i>)	1.0 to 2.0 L/ha
The false spider mite (<i>Brevipalpus phoenicis</i>)	0.5 to 2.0 L/ha	
<i>Beauveria bassiana</i> , Simbi BB 15	Maize leafhopper (<i>Dalbulus maidis</i>)	0.1 to 0.5 L/ha
	Whitefly (<i>Bemisia tabaci</i>)	0.1 to 0.5 L/ha
	The neotropical brown stink bug (<i>Euschistus heros</i>)	0.2 to 0.35 L/ha
	The Neotropical green-belly stink bug (<i>Diceraeus melacanthus</i>)	0.2 to 0.35 L/ha
	The coffee berry borers (<i>Hypothenemus hampei</i>)	0.2 to 0.3 L/ha
	Cotton thrips (<i>Frankliniella schultzei</i>)	100 to 250 mL/ha
	The boll weevil (<i>Anthonomus grandis</i>)	250 to 400 mL/ha
Two-spotted spider mite (<i>Tetranychus urticae</i>)	0.25 to 0.5 L/ha	

	Maize leafhopper (<i>Dalbulus maidis</i>)	50 to 250 g/ha
	Whitefly (<i>Bemisia tabaci</i>)	50 to 250 g/ha
	Whitefly (<i>Bemisia tabaci</i>)	100 to 300 mL/ha
<i>Beauveria bassiana</i> , CBMAI 2359	Maize leafhopper (<i>Dalbulus maidis</i>)	100 to 300 mL/ha
	The Neotropical brown stink bug (<i>Euschistus heros</i>)	200 to 300 mL/ha
	The Neotropical green-belly stink bug (<i>Diceraeus melacanthus</i>)	200 to 300 mL/ha
<i>Beauveria bassiana</i> , PPRI 5339	The thrips (<i>Thrips tabaci</i>)	1000 to 2000 mL/ha
	Whitefly (<i>Bemisia tabaci</i>)	500 to 2000 mL/ha
<i>Beauveria bassiana</i> , CBMAI 1306	Cucurbit beetle (<i>Diabrotica speciosa</i>)	0.65 L/ha
<i>Beauveria bassiana</i> , CG 1420	The sugarcane weevil (<i>Sphenophorus levis</i>)	100 to 300 g/ha
	The coffee berry borers (<i>Hypothenemus hampei</i>)	75 to 200 g/ha
<i>Beauveria bassiana</i> , ESALQ 1432	The Asian citrus psyllid (<i>Diaphorina citri</i>)	75 to 150 g/ha
	Whitefly (<i>Bemisia tabaci</i> raça B)	0.5 Kg/ha
	Banana borer (<i>Cosmopolites sordidus</i>).	3.4 Kg/ha
	Two-spotted spider mite (<i>Tetranychus urticae</i>)	0.7 Kg/ha
	Maize leafhopper (<i>Dalbulus maidis</i>)	5.4 Kg/ha
	The sugarcane weevil (<i>Sphenophorus levis</i>)	4.8Kg/ha
<i>Beauveria bassiana</i> , IBCB 66	The coffee berry borers (<i>Hypothenemus hampei</i>) – Up to 5000 plants	1.6 to 3.0 Kg/ha
	The coffee berry borers (<i>Hypothenemus hampei</i>) - Between 5000 and 10,000 plants	3.0 to 4.3 Kg/ha
	The coffee berry borers (<i>Hypothenemus hampei</i>) - Between 10,000 and 15,000 plants	4.3 to 5.6 Kg/ha
	The coffee berry borers (<i>Hypothenemus hampei</i>) - Between 15,000 and 20,000 plants	5.6 to 6.6 Kg/ha
<i>Isaria fumosorosea</i> , ESALQ – 4778	The Asian citrus psyllid (<i>Diaphorina citri</i>)	200 to 1000 mL/ha
	Whitefly (<i>Bemisia tabaci</i>)	100 to 500 mL/ha
<i>Isaria fumosorosea</i> , ESALQ - 3422	Whitefly (<i>Bemisia tabaci</i> raça B)	150 to 300 g/ha
	The Asian citrus psyllid (<i>Diaphorina citri</i>)	100 to 400 mL/100L of water
	White Cochineal (<i>Planococcus citri</i>)	50 to 100 mL/100L of water
<i>Isaria fumosorosea</i> , ESALQ - 1296	Buckskin (<i>Phyllocoptruta oleivora</i>)	100 to 200 mL/100L of water
	Flat mite (<i>Brevipalpus yothersi</i>)	100 to 200 mL/100L of water
	Citrus blackfly (<i>Aleurocanthus woglumi</i>)	50 to 100 mL/100L of water

	Citrus Snow Scale (<i>Unaspis citri</i>)	100 to 200 mL/100L of water
	Cotton bollworm (<i>Helicoverpa armigera</i>)	1000 to 1500 mL/ha
<i>Isaria javanica</i> , BV14	Whitefly (<i>Bemisia tabaci</i> raça B)	0.5 to 2.0 L/ha
	The Asian citrus psyllid (<i>Diaphorina citri</i>)	0.5 to 2.0 L/ha
	The fall armyworm (<i>Spodoptera frugiperda</i>)	0.5 to 2.0 L/ha
	The spittlebug (<i>Mahanarva fimbriolata</i>)	1.4 L/ha
<i>Metarhizium anisopliae</i> (Metsch), IBCB348	The spittlebug (<i>Mahanarva fimbriolata</i>)	0.5 to 1.0 Kg/ha (Sugar cane)
	The spittlebug (<i>Mahanarva fimbriolata</i>)	0.3 to 1.0 Kg/ha (Pasture)
	Coffee leaf miner (<i>Leucoptera coffeella</i>)	0.5 to 2.0 L/ha
<i>Metarhizium anisopliae</i> , BV12	The fall armyworm (<i>Spodoptera frugiperda</i>)	1.0 to 2.0 L/ha
	The sugarcane weevil (<i>Sphenophorus levis</i>)	1.0 to 1.5 L/ha
	The boll weevil (<i>Anthonomus grandis</i>)	1.0 to 1.5 L/ha
	Grasshopper leafhopper (<i>Deois flavopicta</i>)	1.0 to 2.0 L/ha
<i>Metarhizium anisopliae</i> , CCT8094	The spittlebug (<i>Mahanarva fimbriolata</i>)	Depends on the formulation
	Grasshopper leafhopper (<i>Zulia entreriana</i>)	
	Grasshopper leafhopper (<i>Deois flavopicta</i>)	
<i>Metarhizium rileyi</i> , PHP1705	The fall armyworm (<i>Spodoptera frugiperda</i>)	100 to 150 g/ha
<i>Metarhizium rileyi</i> , CCT7771	The fall armyworm (<i>Spodoptera frugiperda</i>)	1.0 to 2.0 L/ha
<i>Paecilomyces fumosoroseus</i>	Whitefly (<i>Bemisia tabaci</i> raça B)	0.5 to 1.5 L/ha
	Maize leafhopper (<i>Dalbulus maidis</i>)	0.5 to 2.0 L/ha
	The sugarcane weevil (<i>Sphenophorus levis</i>)	1.0 to 3.0 L/ha
<i>Paecilomyces lilacinus</i> , CCT 7766	Root-knot nematode (<i>Meloidogyne incognita</i>)	1.0 to 4.0 L/ha
	Root-knot nematode (<i>Meloidogyne incognita</i>)	600 g /ha
	Root-knot nematode (<i>Meloidogyne javanica</i>)	100 to 250 g/ha
	Root-lesion nematode (<i>Pratylenchus brachyurus</i>)	0.1 to 0.25Kg/100Kg of seed
<i>Paecilomyces lilacinus</i> , UEL Pae 10	Root-knot nematode (<i>Meloidogyne incognita</i>)	0.1Kg /100 Kg of seed
	Root-knot nematode (<i>Meloidogyne incognita</i>)	1 bottle for 15 ha after transplant
<i>Paecilomyces lilacinus</i> , CCT 2146	Root-knot nematode (<i>Meloidogyne incognita</i>)	1 bottle for 15 ha after transplant
	<i>Fusarium</i> root rot (<i>Fusarium solani</i>) - Tratamentos de sementes	100 to 200 mL/100 Kg of seed
	<i>Fusarium</i> root rot (<i>Fusarium solani</i>) - Aplicação no sulco de plantio	250 to 500 mL/ha
<i>Trichoderma afroharzianum</i> , Th2RI99	Charcoal rot (<i>Macrophomina phaseolina</i>)	50 to 200 mL/100 Kg of seed

	Belly rot (<i>Rhizoctonia solani</i>)	100 to 200 mL/100 Kg of seed
	Cottony soft rot (<i>Sclerotinia sclerotiorum</i>)	50 to 250 mL/ha
<i>Trichoderma afroharzianum</i> , CEN 287	Cottony soft rot (<i>Sclerotinia sclerotiorum</i>)	75 g/ha
	Belly rot (<i>Rhizoctonia solani</i>)	50 g/ha
	<i>Fusarium</i> basal rot (<i>Fusarium oxysporum</i>)	50 g/ha
<i>Trichoderma asperellum</i> , CCT 2165	<i>Fusarium</i> basal rot (<i>Fusarium oxysporum</i> f. sp. <i>Lycopersici</i>)	0.5 to 2.0 L/ha
	Belly rot (<i>Rhizoctonia solani</i>)	0.5 to 2.0 L/ha
	Cottony soft rot (<i>Sclerotinia sclerotiorum</i>)	1.0 to 2.0 L/ha
<i>Trichoderma asperellum</i> , kd	Soybean cyst nematode (<i>Heterodera glycines</i>)	125 to 700 g/ha
<i>Trichoderma asperellum</i> , T 211	Red root rot (<i>Fusarium solani</i> f. sp. <i>glycines</i>)	1000 mL/ha
	Belly rot (<i>Rhizoctonia solani</i>)	1000 mL/ha
	Cottony soft rot (<i>Sclerotinia sclerotiorum</i>)	1200 mL/ha
	Cottony soft rot (<i>Sclerotinia sclerotiorum</i>)	1000 mL/ha
<i>Trichoderma asperellum</i> , BV10	Root-lesion nematode (<i>Pratylenchus brachyurus</i>)	1.0 to 4.0 mL/Kg of seed
	Belly rot (<i>Rhizoctonia solani</i>)	100 to 800 mL/ha
	Belly rot (<i>Rhizoctonia solani</i>) - Seed treatment	1.0 to 4.0 mL/Kg of seed
	Cottony soft rot (<i>Sclerotinia sclerotiorum</i>)	100 to 400 mL/ha
	<i>Fusarium</i> basal rot (<i>Fusarium oxysporum</i>) - Seed treatment	0.5 to 4.0 mL/Kg of seed
	<i>Fusarium</i> basal rot (<i>Fusarium oxysporum</i>) - foliar application	100 mL/ha
	Charcoal rot (<i>Macrophomina phaseolina</i>)	100 mL/ha
	Charcoal rot (<i>Macrophomina phaseolina</i>) - Seed treatment	1.0 to 2.0 mL/Kg of seed
<i>Trichoderma asperellum</i> , CBMAI 1622	Cottony soft rot (<i>Sclerotinia sclerotiorum</i>)	1250 g/ha
<i>Trichoderma asperellum</i> , URM-5911	<i>Rhizoctonia solani</i> - Cotton	9.3 g/Kg of seed
	<i>Rhizoctonia solani</i> - Bean	4.6 g/Kg of seed
	<i>Fusarium solani</i> f. sp. <i>phaseoli</i>	2.5 g/Kg of seed
<i>Trichoderma atroviride</i> , 77B	Cottony soft rot (<i>Sclerotinia sclerotiorum</i>)	50 to 300 g/ha
<i>Trichoderma endophyticum</i> , IBCB 56/12	Root-knot nematode (<i>Meloidogyne incognita</i>)	1.5 to 2.0 g/Kg of seed
	Root-lesion nematode (<i>Pratylenchus brachyurus</i>)	1.5 to 2.0 g/Kg of seed
	Soybean cyst nematode (<i>Heterodera glycines</i>)	1.5 to 2.0 g/Kg of seed
<i>Trichoderma hamatum</i> , SYM37537	Root rot and seedling blight (<i>Fusarium verticillioides</i>)	0.27 to 0.75 g/Kg of seed
	<i>Fusarium</i> root rot (<i>Fusarium solani</i>)	0.36 to 0.75 g/Kg of seed
	Charcoal rot (<i>Macrophomina phaseolina</i>)	0.36 to 0.75 g/Kg of seed

	Root and stem rot of soybean (<i>Phytophthora sojae</i>)	0.36 to 1.00 g/Kg of seed
	Belly rot (<i>Rhizoctonia solani</i>)	0.27 to 0.75 g/Kg of seed
	Cottony soft rot (<i>Sclerotinia sclerotiorum</i>)	0.27 to 0.75 g/Kg of seed
	Ear rot of maize (<i>Stenocarpella maydis</i>)	0.36 to 1.00 g/Kg of seed
<i>Trichoderma harzianum</i> , IBLF 006	Cottony soft rot (<i>Sclerotinia sclerotiorum</i>)	0.15 to 0.25 Kg/ha
	Belly rot (<i>Rhizoctonia solani</i>)	0.04 to 0.06/100 Kg of seed
	Charcoal rot (<i>Macrophomina phaseolina</i>)	0.04 to 0.06/100 Kg of seed
<i>Trichoderma harzianum</i> , IB19/17	Cottony soft rot (<i>Sclerotinia sclerotiorum</i>)	Depends on the formulation
	Cottony soft rot (<i>Sclerotinia sclerotiorum</i>)	1.0 to 1.5 Kg /ha
	<i>Fusarium</i> basal rot (<i>Fusarium oxysporum f.sp.lycopersici</i>)	1.0 to 1.5 Kg/ha
<i>Trichoderma harzianum</i> , T-22	Root-lesion nematode (<i>Pratylenchus brachyurus</i>)	0.20 to 0.30 Kg/100 Kg of seed
	Charcoal rot (<i>Macrophomina phaseolina</i>)	0.20 to 0.30 Kg/100 Kg of seed
	Belly rot (<i>Rhizoctonia solani</i>)	100 to 400g /100Kg of seed
	Root and stem rot of soybean (<i>Phytophthora sojae</i>)	100 to 500g/100Kg of seed
	<i>Fusarium</i> root rot (<i>Fusarium solani</i>)	100 to 400g/100Kg of seed
<i>Trichoderma harzianum</i> , ESALQ-1306	Charcoal rot (<i>Macrophomina phaseolina</i>)	100 to 500g/100Kg of seed or 100 to 500g/ha
	Root-lesion nematode (<i>Pratylenchus brachyurus</i>)	100 to 400g/100Kg or
	Root-knot nematode (<i>Meloidogyne incognita</i>)	100 to 500g/100Kg of seed
	Soybean cyst nematode (<i>Heterodera glycines</i>)	
		200 to 400 mL/100 Kg
	Belly rot (<i>Rhizoctonia solani</i>)	100 to 500g for 100Kg of seed (Seed treatment)
		1,5 to 2,5 L/ha (applied to the soil)
<i>Trichoderma harzianum</i> , CCT 7589		200 to 400 mL/100 Kg 100 a
		500g for 100Kg of seed
	Cottony soft rot (<i>Sclerotinia sclerotiorum</i>)	(Seed treatment)
		1.5 to 2.5 L/ha (applied to the soil)
<i>Trichoderma harzianum</i> , T78	Cottony soft rot (<i>Sclerotinia sclerotiorum</i>)	2.0 to 3.0 L/ha
<i>Trichoderma harzianum</i> , 6550	Cottony soft rot (<i>Sclerotinia sclerotiorum</i>)	1 bottle/15 ha
<i>Trichoderma harzianum</i> , BRM 29600	Cottony soft rot (<i>Sclerotinia sclerotiorum</i>)	100 to 400g/ha
<i>Trichoderma koningiopsis</i> , CCT 2142	<i>Fusarium</i> basal rot (<i>Fusarium oxysporum</i>)	1 bottle of 60 mL/15 ha

<i>Trichoderma reesei</i> , CCT 2768	<i>Fusarium</i> basal rot (<i>Fusarium oxysporum</i>)	1 bottle /5 ha
<i>Trichoderma stromaticum</i> , CEPLAC	Cacao witches (<i>Moniliophthora perniciosa</i>)	-
<i>Clonostachys rosea</i> , CPQBA 040-11 DRM 07	Grey mould-rot (<i>Botrytis cinerea</i>)	300 to 600 g/ha
<i>Cordyceps javanica</i> , BRM 27666	Whitefly (<i>Bemisia tabaci</i>)	100 to 200 g/ha
<i>Bacillus amyloliquefaciens</i> , CCT 7901 + <i>Trichoderma asperellum</i> URM 8120 + <i>Trichoderma harzianum</i> , URM 8119	Belly rot (<i>Rhizoctonia solani</i>)	40 to 60g/100Kg of seed
	Cottony soft rot (<i>Sclerotinia sclerotiorum</i>)	100 to 250g/ha
	Anthracnose of bean (<i>Colletotrichum lindemuthianum</i>)	150 to 250g/ha
<i>Bacillus amyloliquefaciens</i> , SVG-0036-B + <i>Bacillus subtilis</i> , SVG-0037-B + <i>Trichoderma asperellum</i> , SVG-00124-F + <i>Trichoderma harzianum</i> , SVG-00003-F	Belly rot (<i>Rhizoctonia solani</i>)	5 to 25 g/ha
<i>Bacillus licheniformis</i> , ATCC 12713 + <i>Bacillus subtilis</i> , ATCC 6051 + <i>Paecilomyces lilacinus</i> (<i>Purpureocillium lilacinum</i>), CPQBA 040-11 DRM 10	Root-knot nematode (<i>Meloidogyne incognita</i>)	50 to 250 g/ha
	Root-lesion nematode (<i>Pratylenchus brachyurus</i>)	90 to 200 g /100 Kg of seed
<i>Bacillus thuringiensis</i> , S 234 + <i>Metarhizium rileyi</i> , CG 1153	Soybean caterpillar (<i>Anticarsia gemmatalis</i>)	70 to 300 g/ha
	Soybean looper (<i>Chrysodeixis includens</i>)	
	Cotton bollworm (<i>Helicoverpa armigera</i>)	25 to 300 g/ha
	The black army worm (<i>Spodoptera cosmioides</i>)	
	Southern armyworm (<i>Spodoptera eridania</i>)	
<i>Beauveria bassiana</i> , IBCB 66 + <i>Metarhizium anisopliae</i> , IBCB 425	The fall armyworm (<i>Spodoptera frugiperda</i>)	70 to 300 g/ha
	Grasshopper leafhopper (<i>Deois flavopicta</i>)	Depends on the formulation
	The neotropical brown stink bug (<i>Euschistus heros</i>)	
<i>Beauveria bassiana</i> , BALL 6-2 + <i>Isaria javanica</i> , URM 7662	Whitefly (<i>Bemisia tabaci</i> raça B)	200 to 350 g/ha
	The Asian citrus psyllid (<i>Diaphorina citri</i>)	600 to 1000 g/ha
	Citrus Snow Scale (<i>Unaspis citri</i>)	200 to 1000 g/ha
	Maize leafhopper (<i>Dalbulus maidis</i>)	300 to 500 g/ha
<i>Bacillus subtilis</i> , CCT 0480 + <i>Trichoderma harzianum</i> , CCT 2160	Root-knot nematode (<i>Meloidogyne incognita</i>)	100 to 350 mL/ha
	Belly rot (<i>Rhizoctonia solani</i>)	90 to 250 g/100 Kg of seed
<i>Bacillus velezensis</i> , CBMAI 1301+ <i>Bacillus velezensis</i> , CBMAI 1304 + <i>Trichoderma harzianum</i> , CPQBA 040-11DRM 09	Belly rot (<i>Rhizoctonia solani</i>)	1.5 to 2.5 Kg/ha
	<i>Fusarium</i> root rot (<i>Fusarium solani</i>)	50 to 300g/ 100Kg of seed
	Cottony soft rot (<i>Sclerotinia sclerotiorum</i>)	300 to 600 g/ha
	Charcoal rot (<i>Macrophomina phaseolina</i>)	75 to 100 g/ha
	Black rot of pineapple (<i>Ceratocystis paradoxa</i>)	250 to 500 g/ha
<i>Trichoderma harzianum</i> , IBLF1278 + <i>Trichoderma harzianum</i> , IBLF1282 + <i>Trichoderma viride</i> , IBLF1275 + <i>Trichoderma viride</i> , IBLF1276	Belly rot (<i>Rhizoctonia solani</i>)	Depends on the formulation
	<i>Fusarium</i> basal rot (<i>Fusarium oxysporum</i>)	

Source: Agrofite (2024)