WHEN USING CHEMICALS, PLEASE CHECK THEIR COMPATIBILITY WITH OUR BENEFICIAL INSECTS ON OUR WEBSITE WWW.BIOBEST.BE

biobest®
SUSTAINABLE CROP MANAGEMENT

www.biobest.be

CROP INFO SHEET

TOMATO

IPM strategy for tomato

CROP INFO SHEET

TOMATO

Support your health

They are many health promoting properties attributed to tomatoes. Tomatoes are particularly rich in lycopene; a carotenoid (know as pro-vitamin A) and strong anti-oxidant. This substance protects against heart and vascular disease and cancer.

What's the benefit of using bumblebees for natural pollination?

The use of bumblebees as natural pollinators creates an important labor saving, improvement of fruit quality and a substantial increase in yield.
Nowadays, bumblebees are worldwide integrated as a common pollination technique in tomato production.

Why developing integrated pest management (IPM) for your tomato crops?

The main disadvantages of applying pesticides are pest resistance and chemical residues. Pesticides are also resulting to be less available due to decreasing effectiveness, imposed restrictions and even withdrawal from the market. Also the release of new active ingredients is summited to strict regulations which results often in long term registration procedures.

IPM is a sustainable crop protection technique.
The use of natural organisms for pest control ensures a healthy crop by excluding the use of harmful and persisting chemicals.
Implementing IPM strategies results into a reduction of pesticide use, residue free produce, safer working environment for the employees, compatibility with bumblebees and beneficial organisms and a better fruit quality.

Due to the increasing awareness of the general public to food safety and environmentally friendly production, as well as the globalization of export markets, IPM strategies can be used as an important marketing tool.

Technical advice

This crop info sheet is a tool intended to explain growers about the use of our products; target pest and dosages .
The technical advice exposed in these sheets is based on a general strategy for areas with a temperate climate in Europe, and may vary from your specific situation and condition.
Check for product authorization and legislation in your country with the local authorities. Contact your nearest Biobest advisor to discuss an appropriate strategy to your conditions.

Advantges

- Residue free
- Food safety
- Environmental friendly
- Sustainable crop protection

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CROP INFO SHEET TOMATO

POLLINATION

Ventilation hive

Hive type

	Standard Hive	Large Hive
Number of workers	60	80
Activity span	6-8 weeks	6-8 weeks
Use	General	Starter Hive Artificial light

How to use the hives?

The theoretical introduction scheme of bumblebee hives in tomatoes:

Surface (m²)	Start up	After 3 weeks	After 4 weeks	After 5 weeks	After 6 weeks	After 7 weeks	After 8 weeks	After 9 weeks	After 10 weeks
1000-2000	1-2	0	1	0	0	1	0	0	1
3000-4000	2-3	1	0	1	0	1	0	0	0
5000-6000	3-4	1	0	2	0	0	1	0	0
7000-8000	4-5	2	0	1	0	2	0	1	0
9000-10000	5-7	2	0	2	0	2	0	2	0

Check for bite marks to determine the moment and amount of hives to be added; when the number of bite marks is decreasing, new hives must be added to reinforce the pollination activity inside the greenhouse.

More hives are resquested in summer than in winter, in summer time plants grow faster and produce more flowers.
Less hives are needed in beef tomatoes than in round tomatoes.
Cherry tomato produces much more flowers, its total bumblebee hive consumption can go up to 2-3 x the normal consumption.

CROP INFO SHEET TOMATO

POLLINATION

How to check the pollination?

Bumblebees leave bite marks on the stamen cone of the flower. By monitoring these bite marks, we check pollination.

Pollination levels are indicated with codes:

Code	Bite mark	Pollination level	Action
1	Very dark to black	Over-pollination	Close the hive for 2-3 days
2	Brown	Very well polinated	
3	Slight brown	Well pollinated	
4	<60-70%	Poorly pollinated	Add hive
5	Poor to none	No pollination	Add hive

Bitemarks of bumblebees

Bitemark 1

Bitemark 2

Bitemark 3

CROP INFO SHEET TOMATO

WHITEFLY

The dosage is based on a standard advice, please check with your advisor to discuss the strategy adapted to your situation

Pest

Egg

Trialeurodes vaporariorum

Bemisia tabaci

Larvae

Adult

Damages

Honeydew

Sooty mold on leaf

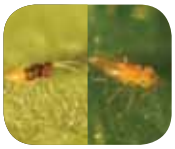
Sooty mold on fruit

TYLCV

Biocontrol agents

Encarsia-System
(*Encarsia formosa*)
Parasitic wasp
Target: *T. vaporariorum* (L3-L4)
Dosage: 3-4 ind/m²/week, min. 4 x
Timing: at first sign of whitefly larvae

Eretmocerus-System
(*Eretmocerus eremicus*)
Parasitic wasp
Target: *T. vaporariorum* & *B. tabaci* (L2-L3)
Dosage: 2 ind. /m²/week, min 4x
Timing: - in summer time
- at mixed whitefly population



Eretmix-System
(*E.formosa* + *E. eremicus*)
Parasitic wasp
Target: *T. vaporariorum* & *B. tabaci* (L2-L4)
Dosage: 3-4 ind./m²/week, min. 4x
Timing: - during transition period from spring to summer releases
- at mixed whitefly population

Mundus-System
(*Eretmocerus mundus*)
Parasitic wasp
Target: *B. tabaci* (L2-L3)
Dosage: 3 ind./m²/week, min. 4x
Timing: at first sign of *Bemisia* larvae

Macrolophus-System
(*Macrolophus pygmaeus*)
Predatory bug
Target: *T. vaporariorum* & *B. tabaci* (eggs & larvae)
Dosage: 0,5-1 ind./m², in 2-4 releases, 1-2 weeks interval
Timing: 1,5-2 months after planting

Nesiodiocoris-System*
(*Nesidiocoris tenuis*)
Predatory bug
Target: *T. vaporariorum* & *B. tabaci* (eggs & larve)
Dosage: 0,5-1 ind./m²/in 2-4 releases 1-2 weeks interval
Timing: 1,5-2 months after planting
* for Mediterranean countries (check local legsilation)

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CROP INFO SHEET TOMATO

WHITEFLY

Biocontrol agents

PreFeRal
(*Paecilomyces fumosoroseus*)
Entomopathogenic fungus
Target: *T. vaporariorum* & *B. tabaci* (larvae & adults)
Dosage: 100 gr/100L water, min. 1.000L/ha
Timing: corrective treatments

Monitoring & Scouting

Bug-Scan Yellow
Yellow sticky traps
Goal: monitoring adult whiteflies
Dosage: 20-40 traps/ha

Signal Clip Yellow
Goal: Indicator clip for hotspots of whitefly larvae in the crop
Dosage: 1 clip per hot spot

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CROP INFO SHEET TOMATO

APHIDS

The dosage is based on a standard advice, please check with your advisor to discuss the strategy adapted to your situation

Pest

Foxglove aphid
(*Aulacorthum solani*)

Potato aphid
(*Macrosiphum euphorbiae*)

Peach aphid
(*Myzus persicae*)

Damages

Molt

Honeydew and sooty mold
on leaf

Honeydew and sooty mold
on fruits

Biocontrol agents

Aphidius-System
(*Aphidius colemani*)
Parasitic wasp
Target: *Myzus persicae*
Dosage: 0,25 ind/m²/week, min. 4 x
Timing: at first sign of aphids

Ervi-System
(*Aphidius ervi*)
Parasitic wasp
Target: *Aulacorthum solani*,
Macrosiphum euphorbiae (*)
Dosage: 0.25 ind./m²/week, min 4x
(*double dosage needed)
Timing: at first sign of aphids

Aphelinus-System
(*Aphelinus abdominalis*)
Parasitic wasp
Target: *Aulocorthum solani*,
Macrosiphum euphorbiae, *Myzus persicae*
Dosage: 0.25 ind./m²/week, min. 4x
Timing: in case of hyperparasitism

Matricariae-System
(*Aphidius matricariae*)
Parasitic wasp
Target: *Myzus persicae* and related species
Aulacorthum solani
Dosage: 0.25 ind./m²/week, min. 4x
Timing: at first sign of aphids

Aphidoletes-System
(*Aphidoletes aphidimyza*)
Predatory gall midge
Target: most aphid species
Dosage: <5 hot spots/ha:
0.5-1 ind./m²/min. 4x
>5 hot spots/ha:
1 ind./m²/week, min. 4x
>10 hot spots/ha:
4 ind./m²/week, min. 4x
Timing: in support of parasitic wasps

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CROP INFO SHEET TOMATO

APHID

Monitoring & Scouting

Bug-Scan Yellow
Yellow sticky traps
Goal: monitoring winged aphids
Dosage: 20-40 traps/ha

Signal Clip Green
Goal: Indicator clip for hotspots of aphid adults and nymphs in the crop
Dosage: 1 clip per hot spot

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CROP INFO SHEET TOMATO

TWO SPOTTED SPIDER MITE

The dosage is based on a standard advice, please check with your advisor to discuss the strategy adapted to your situation

Pest

Tetranychus urticae

Egg

Nymph

Adult

Damages

Feeding damage on leaf

Leaf discoloration

Webbing

Feeding damage on fruit

Biocontrol agents

Phytoseiulus-T-System
(Phytoseiulus persimilis)
Predatory mite
Target: all stages of *T. urticae*
Dosage: min. 20 ind./m², in hotspots , repeat if necessary
Timing: at first sign of spider mites

Macrolophus-N-System
(Macrolophus pygmaeus nymph)
Predatory bug
Target: all stages of *T. urticae*
Dosage: 100-150 ind./hot spot
Timing: in support of Phytoseiulus-T-System

Feltiella-System
(Feltiella acarisuga)
Predatory gall midge
Target: all stages of *T. urticae*
Dosage: low infestation: 2-3 x 250 ind./ha/week, in hot spots
high infestations: 8 x 250 ind./ha/week, min. 4x, in hotspots
Timing: in support of Phytoseiulus-T-System

Monitoring & scouting

Signal Clip Red
Goal: Indicator clip for spider mite hotspots in the crops
Dosage: 1 clip per hotspot

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LEAFMINER

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Pest

Liriomyza spp.

Larva

Pupa

Adult

Damages

Feeding spots on leaf

Galeries

Biocontrol agents

Diglyphus-System
(Diglyphus isaea)
Parasitic wasp
Target: leafminer larvae
Dosage: 0,1-0,25 ind./m²/week, min. 4 x
Timing: at general appearance of galleries

Scouting & monitoring

Bug-Scan Yellow
Yellow sticky traps
Goal: Monitoring adult leafminer
Dosage: 20-40 traps/ha

Signal Clip Orange
Goal: indicator clip for leafminer hotspots (feeding dots and galleries) in the crop
Dosage: 1clip per hotspot

CROP INFO SHEET TOMATO

CATERPILLARS

The dosage is based on a standard advice, please check with your advisor to discuss the strategy adapted to your situation

Pest

Damages

Feeding damage on leaf

Excrements

Feeding damage on fruit

Monitoring & scouting

Delta trap
Pheromone trap, triangle shaped
Goal: monitoring moth
Dosage: 2 traps/ha

Attract lure
Pheromone lure
Dosage: 1 per trap, replace every 4-6 weeks

Signal Clip Purple
Goal: Indicator clip for feeding damage and presence of caterpillars in the crop
Dosage: 1 clip per hotspot

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SOUTH AMERICAN TOMATO PINWORM

The dosage is based on a standard advice, please check with your advisor to discuss the strategy adapted to your situation

Pest

Tuta Absoluta

Egg

Larva

Pupa

Adult

Damages

Galleries on leaf

Damage on stem

Fruit damage

Biocontrol agents

Macrolophus-System
(Macrolophus pygmaeus)
Predatory bug
Target: eggs
Dosage: 1,5-2 ind/m²/week, min. 2-4 releases, 1-2 weeks interval
Timing: according to whitefly control strategy

Nesidiocoris-System
(Nesidiocoris tenuis)*
Predatory bug
Target: eggs
Dosage: 1,5-2 ind./m², in 2-4 releases, 1-2 weeks interval
Timing: according to white fly control strategy

* for Mediterranean countries (check local legislation)

Monitoring & scouting

Delta Trap
Pheromone trap, triangle shaped
Goal: monitoring moth
Dosage: 2 -3 traps/ha

Attract *Tuta absoluta*
Pheromone lure
Dosage: 1 per trap, replace every 4-6 weeks

Tutasan
Pheromone water trap
Goal: monitoring adults
Dosage: 15 traps/ha, 20 cm height

Singal Clip Purple
Goal: indicator clip for first galleries in the crop
Dosage: 1clip per hotspot

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