CONFIDENTIAL REPORT

Project number [redacted] **I-13-6701**
Trial numbers included: **I-13-6701-1**
I-13-6701-2
I-13-6701-3

CONTROL OF *PEPINO MOSAIC VIRUS* IN TOMATO

pagina 1: 10.1.c Wob juncto 63.2.a Vo 1107/2009 juncto 39.2.a Vo 178/2002
pagina 2: 10.2.e, 10.1.c Wob juncto 63.2.a Vo 1107/2009 juncto 39.2.a Vo 178/2002
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Objective: Evaluation of attenuated isolates of *Pepino mosaic virus* for cross-protection.

Period: February – June 2013

Performer: [redacted]

Date: October 2013

Project coordinator: [redacted]

Project manager: [redacted]

Signature: [redacted] Date: 22 October 2013

SUMMARY

In 2013 a project was carried out in The Netherlands to test the efficacy of attenuated isolates of *Pepino mosaic virus* for cross-protection in protected tomato. The project consisted of three trials with six treatments:

Treatment	A1	A2
1	untreated (water)	agEU + agCH
2	untreated (water)	-
3	V10 (VX1 + VC1)	agEU + agCH
4	V10 (VX1 + VC1)	-
5	VC1	agCH
6	VX1	agEU

-: untreated

The first foliar spray application with mild virus isolates of PepMV was carried out when plants were 10-30 cm heigh. The following application with virulent PepMV isolates was conducted with a 7 weeks interval. Assessments on virus symptoms and phytotoxicity were conducted weekly till harvest. At harvest fruit symptoms were assessed and yield was measured.

In one of the trials, a contamination with V10 (VX1 + VC1) of the negative control (treatment 2) was observed in all four tomato cultivars.

PepMV related symptoms on leaves and fruits were strongly reduced in plants infected with attenuated virus isolates before treating the plants with aggressive viral isolates. No clear reduction of flowering, setting of trusses and finally yield occurred after the inoculation with the aggressive isolate. On the other hand also no yield loss occurred in plants that were treated with one of the attenuated isolates. The yield of the cross-protected plants was comparable with the yield of the untreated control plants and comparable or higher than the yield in plants treated with the aggressive isolates. Quality of the harvested fruits was not effected when plants were cross-protected by mild virus isolates.

Some stunting of the plants was observed in all viral objects with the most severe symptoms in the virulent virus control agEU + agCH.

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1 INTRODUCTION

Pepino mosaic virus (PepMV) is a member of the genus Potexvirus which infects mainly solanaceous plants, including tomato, potato and tobacco. Pepino mosaic virus was first found in Peru in 1974 on pepino. Since then, the virus was first reported on greenhouse tomato (*Lycopersicon esculentum*) in the Netherlands and United Kingdom in 1999. Based on the PepMV genomic RNA analysis, the North American strains (US genotypes), PepMV-US1 and PepMV-US2, are closely related to each other but they differ from the European (EU tomato genotype), Chilean (CH2 genotype) and Peruvian (LP genotype) strains. PepMV is considered as a highly infectious and readily transmittable and it systemically infects tomato.

Symptoms

PepMV can cause various symptoms in tomato. Reports on the disease severity of infected plants vary from minor to severe depending on the type of PepMV strain, age, vigour and cultivar of tomato plant and climatic/growing conditions. Symptoms are often expressed during fall and winter months when temperatures and light levels (daylight) are minimal. Initial symptoms usually appear 2-3 weeks after infection. Early symptoms are noticeable on the growing terminals (heads) of infected plants with light-green, thin or needle-like leaves and stunted growth. On leaves symptoms appear as yellow angular spots and bubbly areas, mild interveinal chlorosis (yellowing) and leaf distortions such as spindly leaves. Streaks of browning may appear on stems and flowering clusters that may affect the development of flowers and fruits. Fruits sometimes show discoloration of yellow-red mosaic patterns, called marbling and may lead to uneven fruit ripening. Severely affected plants become stunted and distorted.

PepMV is transmitted mechanically, particularly by contact. PepMV is readily transmitted by contaminated tools, workers' hands and clothing. Direct plant-to-plant contact and propagation by grafting can also spread the virus.

In 2013 a project was carried out in The Netherlands in protected tomato to examine whether tomato plants can be protected against PepMV by a preceding infection with an attenuated isolate of this virus. The project was conducted conform GEP (Good Experimental Practice) standards.

Three efficacy & crop safety trials were carried out, situated in greenhouses in [redacted] (I-13-6701-1) and [redacted] (I-13-6701-2 and 3). The trials consisted of six objects: one object with a single infection of V10 (VX1 + VC1), one object with V10 followed by agEU + agCH, one object with VX1 followed by agEU, one object with VC1 followed by agCH, the virulent virus control agEU + agCH and the untreated control (virus-free).

The purposes of the project were:
- evaluation of mild virus isolates VX1, VC1 and V10 in tomato for the control of virulent isolates
- determine crop safety

In chapter 2 the materials and methods used in this project will be explained. The results obtained from the trials will be discussed in chapter 3 and the conclusions drawn are given in chapter 4.
Appendix 1 contains the GEP certificate for recognition of efficacy testing and the BBCH growth stage scale is given in appendix 2. Appendix 3 contains the climatic data. Appendix 4 contains the raw data of the assessments.

2 MATERIALS AND METHODS

2.1 Trial site

Three trials were laid out in this project, consisting of six treatments (see Table 1). The virulent isolate agEU + agCH was used as virulent virus control.

The plots were laid out with 4 replicates. Each replicate consisted of another tomato cultivar, [redacted] (cocktail tomato), [redacted] (all truss tomato), which are all common commercial cultivars in the Netherlands. Each plot consisted of 20 or 26 plants. Each block of plants was surrounded by sweet pepper plants (non-host for PepMV). The trial located in [redacted] was devided over two greenhouse compartments and the trial in [redacted] over three greenhouse compartments. The third trial [redacted] was placed in one greenhouse compartment. The layout of the trials is given in chapter 3.

2.2 Treatments

The first application with mild viruses was conducted when the crop was 10-30 cm heigh. The following application with the virulent virus was conducted with a 7 weeks interval. In Table 1 the different virus isolates are given.

Table 1: Treatments, virus isolates and application timings

Treatment	A1	A2
1	untreated (water)	agEU + agCH
2	untreated (water)	-
3	V10 (VX1 + VC1)	agEU + agCH
4	V10 (VX1 + VC1)	-
5	VC1	agCH
6	VX1	agEU

-: untreated

Continued Table 1: Treatments, virus isolates and application timings

Virus isolate	
VX1	mild Peruvian strain
VC1	mild Chile-2 strain
agEU	aggressive European strain
agCH	aggressive Chile strain

2.3 Application details

The equipment used to carry out the first application with mild viruses was a high-pressure spraying arm carrying spraying nozzles of type XRTEEJET 11003VK. The amount of spray liquid used was 0.27-0.49 L/m², sprayed at a pressure of 15 bar. Carborundum was added to the spray solution to provide enough abrasion to introduce virus into the plant cells. The first application for all locations was carried out in the greenhouse of [redacted] hereafter plants were divided over three locations: [redacted] During the applications the plots were

separated by plastic screens to avoid spray drift. The second application with the virulent isolates was carried out by diping fingers (with latex gloves) in the virus suspension (sap from the upper leaves of tomato plants infected with virus) and rubbing two leaves on each plant.
Two-three weeks after the first and second application leaf samples (one sample per plant) were taken for ELISA to ensure the absence of virus in the control treatment and to check whether the plants were for 100% infected with the mild and the virulent viruses. To confirm the identity of the mild and virulent viruses in the infected plants real-time PCR was performed on mixtures of leaf samples of each plot of 20 or 26 plants.

2.4 Assessment details

Assessments on virus symptoms in the apical leaves and foliage were carried out weekly or with a longer interval. Per plot the percentage nettle head, mosaic, yellow spots, leaf necrosis, stem necrosis and chlorosis was recorded. Furthermore, flowering and setting of trusses was assessed and fruits were evaluated on viral symptoms. Occurrence of phytotoxic symptoms and crop condition was assessed according to the following scale:

Crop safety (10-1):
10 no phytotoxic symptoms compared to the untreated control
9 symptoms hardly visible
8 a small trace of symptoms
7 light, but clearly visible symptoms
6 light till moderate symptoms
5 moderate symptoms
4 severe symptoms
3 very severe symptoms
2 crop almost dead
1 crop dead

Crop condition (10-1)
10 excellent crop condition,
9 very good crop condition,
8 good crop condition,
7 reasonable crop condition,
6 moderate crop condition,
5 unsatisfied crop condition,
4 bad crop condition,
3 very bad crop condition,
2 crop nearly dead,
1 crop dead

Tomato fruits (in total three trusses per plant) were harvested five [redacted] and four [redacted] times from mid May till mid till June. Harvest at the [redacted] was carried out weekly from the beginning of May till the beginning of June. On the day of harvest, fruits were rated for the presence of marbling, fruit discolourations, damage and deformations.

A very strict hygiene protocol was implemented to avoid contaminations between treatments. All personnel followed a specific working order to reduce the consequences of accidental contamination between treatments. The uninfected treatment was always visited prior to the other treatment.

2.5 Guidelines

The project was carried out according to the following EPPO guidelines:

PP 1/135(3)	Phytotoxicity assessment.
PP 1/152(4)	Design and analysis of efficacy evaluation trials.
PP 1/181(4)	Conduct and reporting of efficacy evaluation trials.

2.6 Statistical analysis

Data were analyzed statistically by regression analysis (GENSTAT). Values followed by the same letter did not differ significantly (p=0.05).

3 TRIAL SITE DETAILS AND RESULTS

In this chapter the following abbreviations are used:

PESINC	Pest incidence
PESSEV	Pest severity

For the presentation of the results the following descriptions were discussed:

- treatment 1: virulent virus control
- treatment 2: negative control
- treatment 3: efficacy V10
- treatment 4: phytotoxicity control
- treatment 5: efficacy VC1
- treatment 6: efficacy VX1

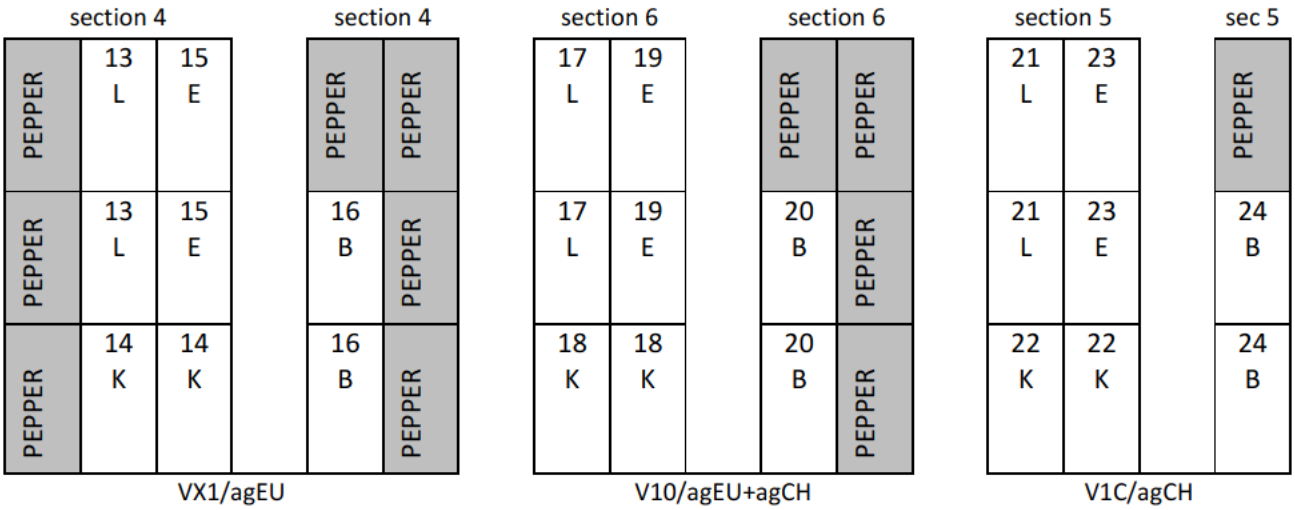
3.1 Trial site details I-13-6701-1

Trial location

Location:	[redacted]	GPS north latitude:	[redacted]
		GPS east longitude:	[redacted]
Street:	[redacted]		
Province:	[redacted]		
Country:	[redacted]		

Trial lay-out

section 1			section 2		section 2		section 2		section 3		sec 3
PEPPER	1 L	3 E	PEPPER	PEPPER	5 L	7 E	PEPPER	PEPPER	9 L	11 E	PEPPER
PEPPER	1 L	3 E	4 B	PEPPER	5 L	7 E	8 B	PEPPER	9 L	11 E	12 B
PEPPER	2 K	2 K	4 B	PEPPER	6 K	6 K	8 B	PEPPER	10 K	10 K	12 B
Untreated (water)					V10/untreated				untreated (water)/agEU+agCH		



[redacted]

Cultural conditions of the trial site

Soil type:	Rockwool		

Crop:	Tomato	Target temperature:	Day: 20°C
Cultivars:	[redacted]		Night: 18°C
Plot size:	20 plants	Lit:	No

Data on crop and climatic conditions during the applications

Application date ('13)	0102	2103
Application number	A1	A2
Treatments sprayed	1-6	1-6
Interval (weeks)	-	7
Crop conditions		
Crop stage[1])	12-13	51
Wetness of foliage	dry	dry
Wetness of soil surface	moist	moist
Climatic conditions		
Temperature (ºC)	20	18.1-19.6
Relative humidity (%)	75-80	71-78
Weather type	cloudy	cloudy
Cloud cover (%)	90	100

[1]) BBCH growth stage scale, see appendix 2.

Test site maintenance

Applied chemicals during trial period		
Date	Product	Rate
	none	
Irrigation during trial period		
Date	Method	Amount
daily	trickle irrigation	0.38-9.12 L/m²/day

3.2 Results I-13-6701-1

All plants inoculated with PepMV were ELISA positive and the non-infected control was virus free.

<u>PepMV related symptoms on tomato</u>

The figures for the PepMV related symptoms on the apical leaves and foliage per tomato cultivar are given in Table 3. Furthermore, as soon as fruit setting occurred, assessments on PepMV related symptoms on fruits were carried out.

Table 3: Symptom scores on tomato in trial I-13-6701-1 (n= 20 plants).

Description			**Nettle head**							
Rating Date			150313		120413		190413		260413	
Rating Type			PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)	cultivar								
-	agEU+agCH	[redacted]	0	0	30	100	15	100	20	100
-		[redacted]	0	0	20	100	10	100	20	100
-		[redacted]	0	0	20	100	15	100	20	100
-		[redacted]	0	0	10	100	15	100	20	100
-	-	[redacted]	0	0	0	0	0	0	0	0
-		[redacted]r	0	0	0	0	0	0	0	0
-		[redacted]	0	0	0	0	0	0	0	0
-		[redacted]	0	0	0	0	0	0	0	0
V10	agEU+agCH	[redacted]	10	100	5	100	0	0	0	0
V10		[redacted]	10	100	5	100	0	0	0	0
V10		[redacted]	15	100	5	100	0	0	0	0
V10		[redacted]	10	100	5	100	0	0	0	0
V10	-	[redacted]	5	100	0	0	0	0	5	100
V10		[redacted]	5	100	5	100	0	0	5	100
V10		[redacted]	10	100	5	100	0	0	5	100
V10		[redacted]	0	0	10	10	0	0	5	100
VC	agCH	[redacted]	10	100	5	100	0	0	0	0
VC		[redacted]	10	100	5	100	0	0	0	0
VC		[redacted]	10	100	5	100	0	0	0	0
VC		[redacted]	5	100	5	100	0	0	0	0
VX	agEU	[redacted]	0	0	0	0	0	0	0	0
VX		[redacted]	0	0	0	0	0	0	0	0
VX		[redacted]	0	0	0	0	0	0	0	0
VX		[redacted]	0	0	0	0	0	0	0	0

A1 (010213): mild virus, A2 (210313): aggressive virus

A1: - = water sprayed

Continued Table 3: Symptom scores on tomato in trial I-13-6701-1 (n= 20 plants).

Description			**Nettle head**			
Rating Date			030513		240513	
Rating Type			PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)	cultivar				
-	agEU+agCH	[redacted]	10	100	70	100
-		[redacted]	20	100	85	100
-		[redacted]	10	100	85	100
-		[redacted]	30	100	90	100
-	-	[redacted]	0	0	0	0
-		[redacted]	0	0	0	0
-		[redacted]	0	0	0	0
-		[redacted]	0	0	0	0
V10	agEU+agCH	[redacted]	0	0	0	0
V10		[redacted]	0	0	0	0
V10		[redacted]	0	0	0	0
V10		[redacted]	0	0	0	0
V10	-	[redacted]	0	0	0	0
V10		[redacted]	0	0	0	0
V10		[redacted]	0	0	0	0
V10		[redacted]	0	0	0	0
VC	agCH	[redacted]	0	0	0	0
VC		[redacted]	0	0	0	0
VC		[redacted]	0	0	0	0
VC		[redacted]	0	0	0	0
VX	agEU	[redacted]	0	0	0	0
VX		[redacted]	0	0	0	0
VX		[redacted]	0	0	0	0
VX		[redacted]	0	0	0	0

A1 (010213): mild virus, A2 (210313): aggressive virus

A1: - = water sprayed

Continued Table 3: Symptom scores on tomato in trial I-13-6701-1 (n= 20 plants).

Description			**Mosaic**							
Rating Date			150313		120413		190413		260413	
Rating Type			PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)	cultivar								
-	agEU+agCH	[redacted]	0	0	0	0	0	0	0	0
-		[redacted]	0	0	0	0	0	0	0	0
-		[redacted]	0	0	0	0	0	0	0	0
-		[redacted]	0	0	0	0	0	0	0	0
-	-	[redacted]	0	0	0	0	0	0	0	0
-		[redacted]	0	0	0	0	0	0	0	0
-		[redacted]	0	0	0	0	0	0	0	0
-		[redacted]	0	0	0	0	0	0	0	0
V10	agEU+agCH	[redacted]	0	0	0	0	0	0	0	0
V10		[redacted]	0	0	0	0	0	0	0	0
V10		[redacted]	0	0	0	0	0	0	0	0
V10		[redacted]	0	0	0	0	0	0	0	0
V10	-	[redacted]	0	0	0	0	0	0	0	0
V10		[redacted]	0	0	0	0	0	0	0	0
V10		[redacted]	0	0	0	0	0	0	0	0
V10		[redacted]	0	0	0	0	0	0	0	0
VC	agCH	[redacted]	0	0	0	0	0	0	0	0
VC		[redacted]	0	0	0	0	0	0	0	0
VC		[redacted]	0	0	0	0	0	0	0	0
VC		[redacted]	0	0	0	0	0	0	0	0
VX	agEU	[redacted]	0	0	0	0	0	0	0	0
VX		[redacted]	0	0	0	0	0	0	0	0
VX		[redacted]	0	0	0	0	0	0	0	0
VX		[redacted]	0	0	0	0	0	0	0	0

A1 (010213): mild virus, A2 (210313): aggressive virus

A1: - = water sprayed

Continued Table 3: Symptom scores on tomato in trial I-13-6701-1 (n= 20 plants).

Description			**Mosaic**			
Rating Date			030513		240513	
Rating Type			PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)	cultivar				
-	agEU+agCH	[redacted]	0	0	0	0
-		[redacted]	0	0	0	0
-		[redacted]	0	0	0	0
-		[redacted]	0	0	0	0
-	-	[redacted]	0	0	0	0
-		[redacted]	0	0	0	0
-		[redacted]	0	0	0	0
-		[redacted]	0	0	0	0
V10	agEU+agCH	[redacted]	0	0	0	0
V10		[redacted]	0	0	0	0
V10		[redacted]	0	0	0	0
V10		[redacted]	0	0	0	0
V10	-	[redacted]	0	0	0	0
V10		[redacted]	0	0	0	0
V10		[redacted]	0	0	0	0
V10		[redacted]	0	0	0	0
VC	agCH	[redacted]	0	0	0	0
VC		[redacted]	0	0	0	0
VC		[redacted]	0	0	0	0
VC		[redacted]	0	0	0	0
VX	agEU	[redacted]	0	0	0	0
VX		[redacted]	0	0	0	0
VX		[redacted]	0	0	0	0
VX		[redacted]	0	0	0	0

A1 (010213): mild virus, A2 (210313): aggressive virus

A1: - = water sprayed

Continued Table 3: Symptom scores on tomato in trial I-13-6701-1 (n= 20 plants).

Description			**Yellow spots**							
Rating Date			150313		120413		190413		260413	
Rating Type			PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)	cultivar								
-	agEU+agCH	[redacted]	0	0	0	0	0	0	0	0
-		[redacted]	0	0	0	0	0	0	0	0
-		[redacted]	0	0	0	0	0	0	0	0
-		[redacted]	0	0	0	0	0	0	0	0
-	-	[redacted]	0	0	0	0	0	0	0	0
-		[redacted]	0	0	0	0	0	0	0	0
-		[redacted]	0	0	0	0	0	0	0	0
-		[redacted]	0	0	0	0	0	0	0	0
V10	agEU+agCH	[redacted]	0	0	0	0	0	0	0	0
V10		[redacted]	0	0	0	0	0	0	0	0
V10		[redacted]	0	0	0	0	0	0	0	0
V10		[redacted]	0	0	0	0	0	0	0	0
V10	-	[redacted]	0	0	0	0	0	0	0	0
V10		[redacted]	0	0	0	0	0	0	0	0
V10		[redacted]	0	0	0	0	0	0	0	0
V10		[redacted]	0	0	0	0	0	0	0	0
VC	agCH	[redacted]	0	0	0	0	0	0	0	0
VC		[redacted]	0	0	0	0	0	0	0	0
VC		[redacted]	0	0	0	0	0	0	0	0
VC		[redacted]	0	0	0	0	0	0	0	0
VX	agEU	[redacted]	0	0	0	0	0	0	0	0
VX		[redacted]	0	0	0	0	0	0	0	0
VX		[redacted]	0	0	0	0	0	0	0	0
VX		[redacted]	0	0	0	0	0	0	0	0

A1 (010213): mild virus, A2 (210313): aggressive virus

A1: - = water sprayed

Continued Table 3: Symptom scores on tomato in trial I-13-6701-1 (n= 20 plants).

Description			**Yellow spots**			
Rating Date			030513		240513	
Rating Type		[redacted]	PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)					
-	agEU+agCH		0	0	0	0
-			0	0	0	0
-			0	0	0	0
-			0	0	0	0
-	-		0	0	0	0
-			0	0	0	0
-			0	0	0	0
-			0	0	0	0
V10	agEU+agCH		0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10	-		0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
VC	agCH		0	0	0	0
VC			0	0	0	0
VC			0	0	0	0
VC			0	0	0	0
VX	agEU		0	0	0	0
VX			0	0	0	0
VX			0	0	0	0
VX			0	0	0	0

A1 (010213): mild virus, A2 (210313): aggressive virus

A1: - = water sprayed

Continued Table 3: Symptom scores on tomato in trial I-13-6701-1 (n= 20 plants).

Description			**Necrosis leaf**							
Rating Date			150313		120413		190413		260413	
Rating Type			PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)									
-	agEU+agCH		0	0	35	100	20	100	30	100
-			0	0	30	100	25	100	30	100
-			0	0	20	100	20	100	30	100
-			0	0	20	100	10	100	20	100
-	-		0	0	0	0	1	100	0	0
-			0	0	0	0	1	100	0	0
-			0	0	0	0	1	100	0	0
-			0	0	0	0	1	100	0	0
V10	agEU+agCH		0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10	-		0	0	0	0	1	100	0	0
V10			0	0	0	0	1	100	0	0
V10			0	0	0	0	1	100	0	0
V10			0	0	0	0	1	100	0	0
VC	agCH		0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VX	agEU		0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0

A1 (010213): mild virus, A2 (210313): aggressive virus

A1: - = water sprayed

Continued Table 3: Symptom scores on tomato in trial I-13-6701-1 (n= 20 plants).

Description			**Necrosis leaf**			
Rating Date			030513		240513	
Rating Type			PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)					
-	agEU+agCH		20	100	60	100
-			20	100	65	100
-			20	100	75	100
-			20	100	80	100
-	-		0	0	0	0
-			0	0	0	0
-			0	0	0	0
-			0	0	0	0
V10	agEU+agCH		0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10	-		0	0	1	100
V10			0	0	1	100
V10			0	0	1	100
V10			0	0	1	100
VC	agCH		0	0	0	0
VC			0	0	0	0
VC			0	0	0	0
VC			0	0	0	0
VX	agEU		0	0	0	0
VX			0	0	0	0
VX			0	0	0	0
VX			0	0	0	0

A1 (010213): mild virus, A2 (210313): aggressive virus
A1: - = water sprayed

Continued Table 3: Symptom scores on tomato in trial I-13-6701-1 (n= 20 plants).

Description			**Necrosis stem**							
Rating Date			150313		120413		190413		260413	
Rating Type			PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)									
-	agEU+agCH		0	0	5	100	20	100	25	100
-			0	0	10	100	10	100	5	100
-			0	0	2	100	10	100	5	100
-			0	0	5	100	10	100	5	100
-	-		0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
V10	agEU+agCH		0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10	-		0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
VC	agCH		0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VX	agEU		0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0

A1 (010213): mild virus, A2 (210313): aggressive virus

A1: - = water sprayed

Continued Table 3: Symptom scores on tomato in trial I-13-6701-1 (n= 20 plants).

Description			**Necrosis stem**			
Rating Date			030513		240513	
Rating Type			PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)					
-	agEU+agCH		0	0	5	100
-			0	0	5	100
-			0	0	5	100
-			0	0	10	100
-	-		0	0	0	0
-			0	0	0	0
-			0	0	0	0
-			0	0	0	0
V10	agEU+agCH		0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10	-		0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
VC	agCH		0	0	0	0
VC			0	0	0	0
VC			0	0	0	0
VC			0	0	0	0
VX	agEU		0	0	0	0
VX			0	0	0	0
VX			0	0	0	0
VX			0	0	0	0

A1 (010213): mild virus, A2 (210313): aggressive virus
A1: - = water sprayed

As shown in Table 3, no PepMV symptoms were visible in the untreated control treatment indicating that spreading of the virus did not happen.

Plants which were inoculated with attenuated isolates of PepMV (V10, VC1 and VX1) showed symptoms of nettle head (except VX) on the apical leaves six weeks after the inoculation. After inoculation of these plants with aggressive viruses, mild symptoms of nettle head remained visible but symptoms became less evident as the growing season progressed. More severe PepMV symptoms were visible in plants that were only treated with the aggressive virus when compared with cross-protected plants. Nettle head and necrosis (leaf and stem) was visible and remained visible till the end of the trial. Minor differences in PepMV symptoms occurred between the different tomato cultivars. In Table 4 the average symptom scores (expected values from statistic model which come close to calculated values) throughout the trial are given.

Table 4. Average symptom scores on the apical leaves in trial I-13-6701-1

	Symptom		**Nettle head**	**Mosaic**	**Necrosis leaf**	**Necrosis stem**
	Rating Type		PESSEV area	PESSEV area	PESSEV area	PESSEV area
	Rating Unit		%	%	%	%
Trt	A1	A2				
1	-	agEU+agCH	26 a	0.0 a	27.1 a	5.7 a
2	-	-	0 c	0.0 a	0.2 b	0.0 b
3	V10	agEU+agCH	3 b	0.0 a	0.0 c	0.0 b
4	V10	-	3 b	0.0 a	0.2 b	0.0 b
5	VC	agCH	2 b	0.0 a	0.0 c	0.0 b
6	VX	agEU	0 c	0.0 a	0.0 c	0.0 b

	Symptom		**Yellow spots**	**Chlorosis**
	Rating Type		PESSEV area	PESSEV area
	Rating Unit		%	%
Trt	A1			
1	-	agEU+agCH	0.0 a	0.0 a
2	-	-	0.0 a	0.0 a
3	V10	agEU+agCH	0.0 a	0.0 a
4	V10	-	0.0 a	0.0 a
5	VC	agCH	0.0 a	0.0 a
6	VX	agEU	0.0 a	0.0 a

A1 (010213): mild virus, A2 (210313): aggressive virus
A1: - = water sprayed

As shown in Table 4, PepMV related symptoms (nettle head and necrosis) were significantly reduced in treatments 3 till 6. Cross-protection with mild viruses reduces the leaf symptoms caused by more aggressive isolates.

Assessments on setting and flowering of trusses were carried out once during the trial. In Table 5a the number of trusses is presented per treatment and Table 5b per tomato cultivar. Flowering and setting are expressed in decimal figures. The number represents the trusses that flower or have set. Decimals indicate the part of the youngest truss that flowers or has set.

Table 5a. Flowering and setting of trusses in trial I-13-6701-1

	Date		290313	290313
	Rating Type		flowering	setting
	Rating Unit		NUMBER	NUMBER
Trt	A1	A2		
1	-	agEU+agCH	2.70 a	3.4 a
2	-	-	2.58 ab	3.3 a
3	V10	agEU+agCH	1.88 d	2.6 c
4	V10	-	2.20 bc	2.9 b
5	VC	agCH	2.13 bcd	2.9 bc
6	VX	agEU	2.37 bc	3.0 b

A1 (010213): mild virus, A2 (210313): aggressive virus
A1: - = water sprayed

Table 5b. Flowering and setting of trusses per tomato cultivar in trial I-13-6701-1

Date	290313		290313	
Rating Type	flowering		setting	
Cultivar	NUMBER		NUMBER	
[redacted]	2.15	b	2.9	b
[redacted]	1.93	b	2.6	c
[redacted]	3.18	a	4.0	a
[redacted]	1.98	b	2.7	c

As shown in Table 5a, flowering and setting in treatment 3 (V10/agEU+agCH) was (significantly) lower than in all other treatments, probably caused by a delay in growth. Treatment 1 and 2 showed the highest figures. Flowering and setting of trusses was in cultivar Komeett the highest (see table 5b).

Fruit symptoms

As soon as fruits had developed, assessments were carried out on PepMV related symptoms. Figures for the average percentage of affected fruits are presented in Table 6a. Affected fruits per tomato cultivar is presented in Table 6b.

Table 6a. PepMV related symptoms on fruits in trial I-13-6701-1

	Symptoms		**blotchy**		**marble**		**damaged fruits**		**deformed**	
	Rating Type		fruits		fruits		fruits		fruits	
	Rating Unit		%		%		%		%	
Trt	A1	A2								
1	-	agEU+agCH	1.16	a	2.25	a	0.0	a	1.01	a
2	-	-	0.00	b	0.00	cd	0.0	a	0.05	b
3	V10	agEU+agCH	1.02	a	0.94	ab	0.0	a	0.00	c
4	V10	-	0.93	a	1.39	ab	0.0	a	0.00	c
5	VC	agCH	1.19	a	0.59	bc	0.0	a	0.00	c
6	VX	agEU	0.32	ab	0.09	bcd	0.0	a	0.00	c

	Symptoms		**blossom end rot**		**open fruits**		**damage stem trusses**	
	Rating Type		fruits		fruits		stems	
	Rating Unit		%		%		%	
Trt	A1	A2						
1	-	agEU+agCH	3.2	a	0.0	a	0.0	a
2	-	-	0.0	b	0.0	a	0.0	a
3	V10	agEU+agCH	0.3	b	0.0	a	0.0	a
4	V10	-	0.2	b	0.0	a	0.0	a
5	VC	agCH	0.2	b	0.0	a	0.0	a
6	VX	agEU	0.0	b	0.0	a	0.0	a

A1 (010213): mild virus, A2 (210313): aggressive virus
A1: - = water sprayed

As shown in Table 6a, a limited number of fruits were blotchy, showed marbling, were deformed or displayed blossom end rot, including treatment 1. Although, the number of marbled and deformed fruits and the number of fruits which displayed blossom end rot was slightly reduced in treatments 3 till 6 when compared with treatment 1.

Table 6b. PepMV related symptoms on fruits per tomato cultivar in trial I-13-6701-1

Symptoms Rating Type Cultivar	**blotchy** % fruits		**marble** % fruits		**damaged fruits** % fruits		**deformed** % fruits	
[redacted]	0.0	b	0.0	b	0.0	a	0.00	c
	1.1	a	1.9	a	0.0	a	0.84	a
	1.4	a	0.8	a	0.0	a	0.12	b
	1.7	a	2.0	a	0.0	a	0.00	c

Symptoms Rating Type Cultivar	**blossom end rot** % fruits		**open fruits** % fruits		**damage stem trusses** % stems	
[redacted]	0.0	b	0.0	a	0.0	a
	0.2	b	0.0	a	0.0	a
	0.0	b	0.0	a	0.0	a
	3.3	a	0.0	a	0.0	a

Fruit symptoms hardly differ between the different tomato cultivars. It seems that the number of deformed fruits in cultivar Endeavour was somewhat higher than in the other varieties and the number of fruits which displayed blossom end rot was somewhat higher in cultivar Levanzo. No PepMV related symptoms occurred in cultivar Brioso.

Yield

Assessments on yield were carried out by counting and weighing the number of harvested fruits. Figures are presented in Table 7a. In Table 7b, yield per tomato cultivar is presented. In Table 7c and 7d figures for the yield of immature fruits is presented.

Table 7a. Total number and weight of fruits (n= 20 plants) in trial I-13-6701-1

	Rating Type Rating Unit		YIELD NUMBER total		WEIGHT kg		AVG fruit weight g	
Trt	A1	A2						
1	-	agEU+agCH	541	b	41.6	bc	93.6	b
2	-	-	548	ab	43.1	bc	93.8	b
3	V10	agEU+agCH	557	a	46.3	ab	101.0	ab
4	V10	-	538	b	47.2	a	106.5	a
5	VC	agCH	544	ab	46.1	ab	102.8	a
6	VX	agEU	537	b	44.5	abc	100.3	ab

A1 (010213): mild virus, A2 (210313): aggressive virus
untr: water

The number of fruits as well as the weight of the harvested fruits in plants treated with attenuated viruses (treatments 3 till 6) was in general (significantly) higher when compared with plants treated with only the aggressive isolate (treatment 1). Probably the leaf area of the plants treated with the aggressive isolate (-/agEU+agCH) was too low (due to heavy necrosis) to intercept enough light for photosynthesis and thus for growth and fruit production. Hardly no differences in yield and weight were noticed between the other treatments.

Table 7b. Total number and weight of fruits per tomato cultivar in trial I-13-6701-1

Rating Type Rating Unit	YIELD NUMBER total		WEIGHT kg		AVG fruit weight g	
[redacted]	974	a	33.0	c	33.9	c
	397	b	47.1	b	118.8	b
	404	b	52.0	a	128.9	a
	403	b	47.1	b	117.1	b

The number of fruits of cultivar Brioso was significantly higher than in the other cultivars, but the weight was significantly lower. Brioso is a cocktail tomato. The weight of cultivar Komeett was significantly higher than in Endeavour and Levanzo.

Table 7c. Total number and weight of immature fruits (n= 20 plants) in trial I-13-6701-1

Trt	Rating Type A1	Rating Unit A2	YIELD NUMBER (mature size, not harvested)		WEIGHT kg (mature size, not harvested)		AVG fruit weight g (mature size, not harvested)		WEIGHT kg (immature, not harvested)		WEIGHT kg (total harvested + at the plant)	
1	-	agEU+agCH	449	a	33.8	a	86	bc	9.8	b	85	c
2	-	-	384	b	32.3	a	96	bc	28.8	a	104	ab
3	V10	agEU+agCH	304	c	28.5	b	105	ab	25.7	a	101	b
4	V10	-	337	bc	31.4	ab	110	a	30.5	a	109	a
5	VC	agCH	321	c	28.4	b	109	a	28.2	a	103	ab
6	VX	agEU	338	bc	28.8	b	104	ab	29.2	a	103	ab

A1 (010213): mild virus, A2 (210313): aggressive virus
untr: water

Table 7d. Total number and weight of immature fruits per tomato cultivar in trial I-13-6701-1

Rating Type Rating Unit	YIELD NUMBER (mature size, not harvested)		WEIGHT kg (mature size, not harvested)		AVG fruit weight g (mature size, not harvested)		WEIGHT kg (immature, not harvested)		WEIGHT kg (total harvested + at the plant)	
[redacted]	598	a	21.8	d	37	b	18.5	b	73	c
	280	bc	33.9	b	123	a	29.6	a	111	a
	295	b	37.0	a	128	a	27.7	a	117	a
	249	c	29.4	c	120	a	25.7	a	102	b

Crop safety

Some stunting was observed during the trial. Figures are presented in Table 8.

Table 8. Average phytotoxicity symptoms (%) in trial I-13-6701-1

	Symptom Rating Type		**Stunting**
Trt	A1	A2	%
1	-	agEU+agCH	8.1 a
2	-	-	0.0 d
3	V10	agEU+agCH	1.7 b
4	V10	-	0.8 c
5	VC	agCH	0.8 c
6	VX	agEU	0.0 d

A1 (010213): mild virus, A2 (210313): aggressive virus
A1: - = water sprayed

Stunting occurred in treatment 1, 3, 4 and 5 but was most severe (significantly higher) in treatment 1 (8.1%).

Crop condition

Figures on crop condition are presented in Table 9.

Table 9. Crop condition (10-1) in trial I-13-6701-1

	Desription Rating Date		**Vigor**					
			150313	120413	190413	260413	030513	240513
Trt	A1	A2						
1	-	agEU + agCH	8	5.8	4.8	5	6.3	2.5
2	-	-	8	7	8	8	8	8
3	V10	agEU + agCH	7	7	8	8	8	8
4	V10	-	7	7	8	8	8	8
5	VC	agCH	7	7	8	8	8	8
6	VX	agEU	8	7	8	8	8	8

A1 (010213): mild virus, A2 (210313): aggressive virus
A1: - = water sprayed

Crop condition in treatment 1 with a single infection of agEU + agCH became quite worse due to severe symptoms of necrosis in the apical leaves and nettle head. Crop condition in all other treatments was reasonable to good (score 8).

Presence of PepMV

By means of real-time PCR the presence of the correct viral strains after the second application was determined. The presence of the mild variants and the presence of the challenge isolates in the 'cross-protection' treatments was confirmed.

3.3 Trial site details I-13-6701-2

Trial location

Location:	[redacted]	GPS north latitude: GPS east longitude:	[redacted] [redacted]
Street: Province: Country:	[redacted] [redacted] [redacted]		

Trial lay-out

section 1: untreated (water) section 2: V10/untreated

PEPPER	1 K	2 E	3 L	4 B	PEPPER	PEPPER	1 K	2 E	3 L	4 B	PEPPER

section 3: untreated (water)/agEU+agCH section 5: VX1/agEU

PEPPER	1 K	2 E	3 L	4 B	PEPPER	PEPPER	1 K	2 E	3 L	4 B	PEPPER

section 4: V10/agEU+agCH section 6: VC1/agCH

PEPPER	1 K	2 E	3 L	4 B	PEPPER	PEPPER	1 K	2 E	3 L	4 B	PEPPER

[redacted]

Cultural conditions of the trial site

Soil type:	Rockwool		

Crop: Cultivar: Plot size:	Tomato [redacted] [redacted] 20 plants	Target temperature: Lit:	Day: 20°C Night: 18°C No

Data on crop and climatic conditions during the applications

Application date ('13)	0102	2203
Application number	A1	A2
Treatments sprayed	1-6	1-6
Interval (weeks)	-	7
Crop conditions		
Crop stage[1])	12-13	51
Wetness of foliage	dry	dry
Wetness of soil surface	moist	moist
Climatic conditions		
Temperature (ºC)	20	19.6
Relative humidity (%)	75-80	68
Weather type	cloudy	intermittent cloudy
Cloud cover (%)	90	100

[1]) BBCH growth stage scale, see appendix 2.

Test site maintenance

Applied chemicals during trial period		
Date	Product	Rate
three times	Vertimec (abamectin)	100 ml/100 L
Irrigation during trial period		
Date	Method	Amount
daily	trickle irrigation	0.092-6.5 L/m^2

3.4 Results I-13-6701-2

All plants inoculated with PepMV were ELISA positive and the non-infected control was virus free.

PepMV related symptoms on tomato

The figures for the PepMV related symptoms on the apical leaves and foliage per tomato cultivar are given in Table 10. Furthermore, as soon as fruit setting occurred, assessments on PepMV related symptoms on fruits was carried out.

Table 10: Symptom scores on tomato in trial I-13-6701-2 (n= 20 plants).

Description			**Nettle head**							
Rating Week			14		16		17		18	
Rating Type			PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)									
-	agEU+agCH		60	100	80	100	50	100	25	100
-			70	100	80	100	50	100	30	100
-			60	100	80	100	50	100	40	100
-			60	100	80	100	50	100	30	100
-	-		0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
V10	agEU+agCH		10	100	10	5	0	0	0	0
V10			10	100	10	5	0	0	10	5
V10			10	100	0	0	0	0	0	0
V10			10	100	20	5	20	5	0	0
V10	-		10	100	10	100	0	0	0	0
V10			10	100	10	100	0	0	0	0
V10			10	100	10	100	0	0	0	0
V10			10	100	10	100	0	0	0	0
VC	agCH		0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			10	100	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VX	agEU		1	1	5	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0

A1 (010213): mild virus, A2 (220313): aggressive virus

A1: - = water sprayed

Continued Table 10: Symptom scores on tomato in trial I-13-6701-2 (n= 20 plants).

Description			**Nettle head**							
Rating Week			19		20		21		22	
Rating Type			PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)									
-	agEU+agCH		20	100	10	100	80	100	70	100
-			30	100	10	100	100	100	90	100
-			30	100	10	100	80	100	90	100
-			30	100	10	1000	100	100	90	100
-	-		0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
V10	agEU+agCH		0	0	10	100	20	100	10	100
V10			0	0	10	100	10	100	0	0
V10			0	0	10	100	0	0	0	0
V10			0	0	10	100	40	5	50	5
V10	-		10	5	10	100	15	100	10	100
V10			0	0	0	0	10	100	10	20
V10			10	5	0	0	0	0	0	0
V10			0	0	0	0	10	100	20	5
VC	agCH		0	0	0	0	10	100	10	100
VC			0	0	0	0	10	100	0	0
VC			0	0	0	0	10	100	0	0
VC			0	0	0	0	10	100	10	30
VX	agEU		0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0

A1 (010213): mild virus, A2 (220313): aggressive virus

A1: - = water sprayed

Continued Table 10: Symptom scores on tomato in trial I-13-6701-2 (n= 20 plants).

Description			**Nettle head**			
Rating Week			23		24	
Rating Type			PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)					
-	agEU+agCH		50	100	70	100
-			80	100	70	100
-			80	100	70	100
-			80	100	70	100
-	-		0	0	0	0
-			0	0	0	0
-			0	0	0	0
-			0	0	0	0
V10	agEU+agCH		0	0	0	0
V10			0	0	0	0
V10			30	30	40	5
V10			30	30	30	5
V10	-		0	0	0	0
V10			10	5	0	0
V10			0	0	0	0
V10			0	0	0	0
VC	agCH		0	0	0	0
VC			0	0	10	5
VC			0	0	0	0
VC			0	0	0	0
VX	agEU		0	0	0	0
VX			0	0	0	0
VX			0	0	0	0
VX			0	0	0	0

A1 (010213): mild virus, A2 (220313): aggressive virus

A1: - = water sprayed

Continued Table 10: Symptom scores on tomato in trial I-13-6701-2 (n= 20 plants).

Description			**Mosaic**							
Rating Week			14		16		17		18	
Rating Type			PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)									
-	agEU+agCH		60	100	72	100	50	100	40	100
-			60	100	80	100	50	100	50	100
-			60	100	80	100	55	100	50	100
-			60	100	80	100	50	100	45	100
-	-		0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
V10	agEU+agCH		10	100	10	100	0	0	0	0
V10			10	100	12	45	0	0	10	5
V10			10	100	10	30	0	0	0	0
V10			10	100	13	30	20	5	0	0
V10	-		34	100	43	100	0	0	0	0
V10			10	100	10	100	0	0	0	0
V10			10	100	10	100	0	0	0	0
V10			10	100	10	100	0	0	0	0
VC	agCH		0	0	10	10	0	0	0	0
VC			5	100	10	15	0	0	0	0
VC			8	100	0	0	0	0	0	0
VC			5	10	0	0	0	0	0	0
VX	agEU		0	0	10	10	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	10	5	0	0	0	0
VX			0	0	0	0	0	0	0	0

A1 (010213): mild virus, A2 (220313): aggressive virus

A1: - = water sprayed

Continued Table 10: Symptom scores on tomato in trial I-13-6701-2 (n= 20 plants).

Description			**Mosaic**							
Rating Week			19		20		21		22	
Rating Type			PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)									
-	agEU+agCH		30	100	18	100	47	100	70	100
-			35	100	40	100	100	100	90	100
-			35	100	35	100	90	100	90	100
-			35	100	35	100	91	100	81	100
-	-		0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
V10	agEU+agCH		0	0	10	100	15	100	10	100
V10			0	0	10	100	11	100	11	100
V10			0	0	10	100	10	100	10	100
V10			0	0	10	100	16	100	11	100
V10	-		38	5	20	100	43	100	48	100
V10			0	0	10	100	10	100	10	100
V10			10	5	10	100	10	100	10	100
V10			0	0	10	100	10	100	10	100
VC	agCH		0	0	10	100	15	100	10	100
VC			0	0	8	100	10	100	10	100
VC			0	0	10	100	10	100	10	100
VC			0	0	7	100	12	100	10	100
VX	agEU		0	0	10	100	13	100	10	100
VX			0	0	5	100	10	100	0	0
VX			0	0	5	100	10	100	0	0
VX			0	0	7	100	12	100	0	0

A1 (010213): mild virus, A2 (220313): aggressive virus

A1: - = water sprayed

Continued Table 10: Symptom scores on tomato in trial I-13-6701-2 (n= 20 plants).

Description			**Mosaic**			
Rating Week			23		24	
Rating Type			PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)					
-	agEU+agCH		31	100	70	100
-			80	100	70	100
-			80	100	70	100
-			66	100	70	100
-	-		0	0	0	0
-			0	0	0	0
-			0	0	0	0
-			0	0	0	0
V10	agEU+agCH		10	100	10	100
V10			11	100	12	100
V10			11	100	11	100
V10			11	100	12	5
V10	-		43	100	39	100
V10			10	100	0	0
V10			10	100	0	0
V10			10	100	0	0
VC	agCH		10	100	10	100
VC			10	100	20	5
VC			10	100	10	5
VC			10	100	0	0
VX	agEU		10	25	0	0
VX			0	0	0	0
VX			10	100	0	0
VX			10	100	0	0

A1 (010213): mild virus, A2 (220313): aggressive virus

A1: - = water sprayed

Continued Table 10: Symptom scores on tomato in trial I-13-6701-2 (n= 20 plants).

Description			**Yellow spots**							
Rating Week			14		16		17		18	
Rating Type			PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)									
-	agEU+agCH		0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-	-		0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
V10	agEU+agCH		0.1	45	0.1	40	0.1	15	0.10	35
V10			0.1	45	0.1	35	0.1	30	0.10	20
V10			0.1	40	0.1	20	0.1	20	0.10	25
V10			0.2	40	0.4	35	0.1	25	0.10	10
V10	-		0.1	70	0.1	55	0.1	60	0.11	65
V10			0.1	60	0.1	40	0.1	35	0.11	40
V10			0.1	45	0.1	30	0.1	40	0.10	55
V10			0.1	40	0.1	45	0.1	40	0.11	55
VC	agCH		0.1	75	0.1	80	0.1	45	0.10	55
VC			0.1	75	0.1	35	0.1	45	0.10	45
VC			0.1	65	0.1	45	0.2	40	0.10	25
VC			0.1	55	0.1	60	0.1	25	0.10	25
VX	agEU		0.1	10	0.1	10	0.1	5	0.10	10
VX			0.0	0	0.0	0	0.1	5	0.10	5
VX			0.1	10	0.0	0	0	0	0.01	5
VX			0.1	15	0.1	5	0	0	0.01	5

A1 (010213): mild virus, A2 (220313): aggressive virus

A1: - = water sprayed

Continued Table 10: Symptom scores on tomato in trial I-13-6701-2 (n= 20 plants).

Description			**Yellow spots**							
Rating Week			19		20		21		22	
Rating Type			PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)									
-	agEU+agCH		0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-	-		0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
V10	agEU+agCH		0.1	35	0.1	25	0.1	10	0.1	15
V10			0.1	35	0.1	25	0.1	20	0.1	5
V10			0.1	15	0.1	20	0.1	15	0.1	5
V10			0.1	30	0.1	25	0.1	25	0.1	5
V10	-		0.1	30	0.1	50	0.1	50	0.1	40
V10			0.1	45	0.1	35	0.1	40	0.1	30
V10			0.1	30	0.1	35	0.1	30	0.1	20
V10			0.1	35	0.1	40	0.1	35	0.1	25
VC	agCH		0.1	35	0.1	25	0.1	45	0.1	15
VC			0.1	50	0.1	20	0.1	30	0.1	15
VC			0.1	30	0.1	25	0.1	15	0.1	5
VC			0.1	35	0.1	35	0.1	30	0.1	35
VX	agEU		0	0	0.1	5	0	0	0	0
VX			0	0	0.1	5	0.1	5	0	0
VX			0.1	5	0.1	5	0	0	0.1	5
VX			0.1	5	0.1	10	0.1	5	0	0

A1 (010213): mild virus, A2 (220313): aggressive virus

A1: - = water sprayed

Continued Table 10: Symptom scores on tomato in trial I-13-6701-2 (n= 20 plants).

Description			**Yellow spots**			
Rating Week			23		24	
Rating Type			PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)					
-	agEU+agCH		0	0	0	0
-			0	0	0	0
-			0	0	0	0
-			0	0	0	0
-	-		0	0	0	0
-			0	0	0	0
-			0	0	0	0
-			0	0	0	0
V10	agEU+agCH		0.1	20	0.1	20
V10			0.1	10	0.1	5
V10			0.1	5	0.1	5
V10			0.1	25	0.1	15
V10	-		0.1	45	0.1	35
V10			0.1	10	0.1	10
V10			0.1	5	0.1	20
V10			0.1	50	0.1	35
VC	agCH		0.1	5	0.1	30
VC			0.1	10	0.1	15
VC			0.1	10	0.1	10
VC			0.1	20	0.1	15
VX	agEU		0	0	0.2	15
VX			0	0	0	0
VX			0	0	0	0
VX			0	0	0.1	5

A1 (010213): mild virus, A2 (220313): aggressive virus
A1: - = water sprayed

Continued Table 10: Symptom scores on tomato in trial I-13-6701-2 (n= 20 plants).

Description			**Necrosis leaf**							
Rating Week			14		16		17		18	
Rating Type			PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)									
-	agEU+agCH		30	100	45	100	40	100	40	100
-			40	100	60	100	50	100	50	100
-			40	100	60	100	50	100	50	100
-			40	100	60	100	60	100	50	100
-	-		0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
V10	agEU+agCH		0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			1	5	20	5	10	5	10	5
V10	-		0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
VC	agCH		0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VX	agEU		0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0

A1 (010213): mild virus, A2 (220313): aggressive virus

A1: - = water sprayed

Continued Table 10: Symptom scores on tomato in trial I-13-6701-2 (n= 20 plants).

Description			**Necrosis leaf**							
Rating Week			19		20		21		22	
Rating Type			PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)									
-	agEU+agCH		40	100	50	100	80	100	80	100
-			50	100	70	100	90	100	95	100
-			50	100	60	100	70	100	90	100
-			50	100	60	100	80	100	90	100
-	-		0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
V10	agEU+agCH		0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	3	10	10	5
V10			10	5	30	5	80	5	60	5
V10	-		0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
VC	agCH		0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VX	agEU		0	0	0	0	1	10	0	0
VX			0	0	1	11	5	5	10	5
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0

A1 (010213): mild virus, A2 (220313): aggressive virus

A1: - = water sprayed

Continued Table 10: Symptom scores on tomato in trial I-13-6701-2 (n= 20 plants).

Description			**Necrosis leaf**			
Rating Week			23		24	
Rating Type			PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)					
-	agEU+agCH		80	100	85	100
-			95	100	90	100
-			90	100	95	100
-			90	100	95	100
-	-		0	0	0	0
-			0	0	0	0
-			0	0	0	0
-			0	0	0	0
V10	agEU+agCH		0	0	0	0
V10			0	0	0	0
V10			15	10	25	5
V10			70	5	70	5
V10	-		0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
VC	agCH		0	0	0	0
VC			0	0	0	0
VC			0	0	0	0
VC			0	0	0	0
VX	agEU		0	0	0	0
VX			0	0	0	0
VX			0	0	1	5
VX			0	0	0	0

A1 (010213): mild virus, A2 (220313): aggressive virus
A1: - = water sprayed

Continued Table 10: Symptom scores on tomato in trial I-13-6701-2 (n= 20 plants).

Description			**Necrosis stem**							
Rating Week			14		16		17		18	
Rating Type			PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)									
-	agEU+agCH		10	100	25	100	10	100	30	100
-			10	100	25	100	10	100	30	100
-			10	100	30	100	10	100	30	100
-			10	100	25	100	10	100	30	100
-	-		0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
V10	agEU+agCH		0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10	-		0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
VC	agCH		0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VX	agEU		0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0

A1 (010213): mild virus, A2 (220313): aggressive virus

A1: - = water sprayed

Continued Table 10: Symptom scores on tomato in trial I-13-6701-2 (n= 20 plants).

Description			**Necrosis stem**							
Rating Week			19		20		21		22	
Rating Type			PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)									
-	agEU+agCH		10	100	10	100	20	100	30	100
-			10	100	10	100	50	100	40	100
-			10	100	10	100	20	100	40	100
-			10	100	10	100	20	100	40	100
-	-		0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
V10	agEU+agCH		0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	10	5	10	5	10	5
V10	-		0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
VC	agCH		0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VX	agEU		0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0

A1 (010213): mild virus, A2 (220313): aggressive virus

A1: - = water sprayed

Continued Table 10: Symptom scores on tomato in trial I-13-6701-2 (n= 20 plants).

Description			**Necrosis stem**			
Rating Week			23		24	
Rating Type			PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)					
-	agEU+agCH		25	100	50	100
-			40	100	60	100
-			40	100	60	100
-			40	100	60	100
-	-		0	0	0	0
-			0	0	0	0
-			0	0	0	0
-			0	0	0	0
V10	agEU+agCH		0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10			10	5	0	0
V10	-		0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
VC	agCH		0	0	0	0
VC			0	0	0	0
VC			0	0	0	0
VC			0	0	0	0
VX	agEU		0	0	0	0
VX			0	0	0	0
VX			0	0	0	0
VX			0	0	0	0

A1 (010213): mild virus, A2 (220313): aggressive virus

A1: - = water sprayed

Continued Table 10: Symptom scores on tomato in trial I-13-6701-2 (n= 20 plants).

Description			**Chlorosis**							
Rating Week			14		16		17		18	
Rating Type			PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)									
-	agEU+agCH		0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-	-		0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
V10	agEU+agCH		0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10	-		0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
VC	agCH		0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VX	agEU		0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0

A1 (010213): mild virus, A2 (220313): aggressive virus

A1: - = water sprayed

Continued Table 10: Symptom scores on tomato in trial I-13-6701-2 (n= 20 plants).

Description			**Chlorosis**							
Rating Week			19		20		21		22	
Rating Type			PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)									
-	agEU+agCH		0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-	-		0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
V10	agEU+agCH		0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	10	100	0	0
V10			0	0	0	0	0	0	0	0
V10	-		0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	10	100
V10			0	0	0	0	0	0	0	0
VC	agCH		0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VX	agEU		0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	10	100	0	0
VX			0	0	0	0	0	0	0	0

A1 (010213): mild virus, A2 (220313): aggressive virus

A1: - = water sprayed

Continued Table 10: Symptom scores on tomato in trial I-13-6701-2 (n= 20 plants).

Description			**Chlorosis**			
Rating Week			23		24	
Rating Type			PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)					
-	agEU+agCH		0	0	0	0
-			0	0	0	0
-			0	0	0	0
-			0	0	0	0
-	-		0	0	0	0
-			0	0	0	0
-			0	0	0	0
-			0	0	0	0
V10	agEU+agCH		0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10	-		0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
VC	agCH		0	0	0	0
VC			0	0	0	0
VC			0	0	0	0
VC			0	0	0	0
VX	agEU		0	0	0	0
VX			0	0	0	0
VX			0	0	0	0
VX			0	0	0	0

A1 (010213): mild virus, A2 (220313): aggressive virus
A1: - = water sprayed

As shown in Table 10, no PepMV symptoms were visible in the untreated control treatment indicating that spreading of the virus did not happen.

Plants which were inoculated with attenuated isolates of PepMV (V10, VC and VX) did not show any PepMV related symptoms. After inoculation of these plants with aggressive viruses, mild symptoms of nettle head, mosaic and yellow spots occurred but symptoms became less evident as the growing season progressed. More severe PepMV symptoms were visible in plants that were only treated with the aggressive virus when compared with cross-protected plants. Nettle head, mosaic and necrosis (leaf and stem) was visible and remained visible till the end of the trial. Minor differences in PepMV symptoms occurred between the different tomato cultivars. In Table 11 the average symptom scores (expected values from statistic model which come close to calculated values) throughout the trial are given.

Table 11. Average symptom scores on the apical leaves in trial I-13-6701-2

	Symptom		**Nettle head**	**Mosaic**	**Necrosis leaf**	**Necrosis stem**
	Rating Type		PESSEV area	PESSEV area	PESSEV area	PESSEV area
	Rating Unit		%	%	%	%
Trt	A1	A2				
1	-	agEU+agCH	58 a	63 a	64.8 a	26 a
2	-	-	0 e	0 e	0.0 d	0 c
3	V10	agEU+agCH	10 b	7 b	10.4 b	1 b
4	V10	-	5 c	6 b	0.0 d	0 c
5	VC	agCH	2 d	5 c	0.0 d	0 c
6	VX	agEU	0 e	3 d	0.5 c	0 c

	Symptom		**Yellow spots**	**Chlorosis**
	Rating Type		PESSEV area	PESSEV area
	Rating Unit		%	%
Trt	A1			
1	-	agEU+agCH	0.000 c	0.0 b
2	-	-	0.000 c	0.0 b
3	V10	agEU+agCH	0.011 a	0.3 a
4	V10	-	0.010 a	0.3 a
5	VC	agCH	0.010 a	0.0 b
6	VX	agEU	0.006 b	0.3 a

A1 (010213): mild virus, A2 (220313): aggressive virus
A1: - = water sprayed

As shown in Table 11, PepMV related symptoms (nettle head, mosaic and necrosis) were significantly reduced in treatments 3 till 6. Cross-protection with mild viruses reduces the leaf symptoms caused by more aggressive isolates.

Assessments on flowering and setting of trusses were carried out twice during the trial. In Table 12a the number of trusses is presented per treatment and Table 12b per tomato cultivar. Flowering and setting are expressed in decimal figures. The number represents the trusses that flower or have set. Decimals indicate the part of the youngest truss that flowers or has set.

Table 12a. Flowering and setting of trusses in trial I-13-6701-2

	Week		14	17	
	Rating Type		flowering	flowering	increase in flowering
	Rating Unit		NUMBER	NUMBER	NUMBER
Trt	A1	A2			
1	-	agEU+agCH	4.5 a	6.4	1.9 a
2	-	-	4.8 a	7.6	2.7 a
3	V10	agEU+agCH	4.4 a	7.3	3.0 a
4	V10	-	4.2 a	7.6	3.4 a
5	VC	agCH	4.6 a	7.1	2.4 a
6	VX	agEU	4.7 a	7.1	2.4 a

A1 (010213): mild virus, A2 (220313): aggressive virus
A1: - = water sprayed

Continued Table 12a. Flowering and setting of trusses in trial I-13-6701-2

	Week		14	17	
	Rating Type		setting	setting	increase in setting
	Rating Unit		NUMBER	NUMBER	NUMBER
Trt	A1	A2			
1	-	agEU+agCH	4.2 a	6.9 a	2.7 bc
2	-	-	4.2 a	6.9 a	2.7 bc
3	V10	agEU+agCH	3.4 b	6.9 a	3.4 a
4	V10	-	4.2 a	6.5 a	2.2 bc
5	VC	agCH	3.6 b	6.9 a	3.3 ab
6	VX	agEU	4.1 a	6.4 a	2.3 bc

A1 (010213): mild virus, A2 (220313): aggressive virus
A1: - = water sprayed

Table 12b. Flowering and setting of trusses per tomato cultivar in trial I-13-6701-2

Week	14		17			
Rating Type	flowering		flowering		increase in flowering	
Cultivar	NUMBER		NUMBER		NUMBER	
[redacted]	5.5	a	9.0	a	3.4	a
[redacted]	4.3	b	6.1	b	1.8	b
[redacted]	4.4	b	7.0	b	2.7	ab
[redacted]	4.0	b	6.7	b	2.6	ab
	setting		setting		increase in setting	
Cultivar	NUMBER		NUMBER		NUMBER	
[redacted]	4.7	a	8.1	a	3.4	a
[redacted]	3.8	b	6.5	b	2.7	b
[redacted]	3.8	b	6.5	b	2.7	b
[redacted]	3.6	c	5.9	c	2.4	b

As shown in Table 12a, no differences in flowering of trusses was noticed. A significantly higher number of setted trusses was observed in treatment 3 (V10/agEU+agCH) when compared with treatment 1 (-/agEU+agCH). Flowering and setting of trusses was in cultivar [redacted] the highest (see table 12b).

Fruit symptoms

As soon as fruits had developed, assessments were carried out on PepMV related symptoms. Figures for the average percentage of affected fruits are presented in Table 13a. Affected fruits per tomato cultivar are presented in Table 13b.

Table 13a. PepMV related symptoms on fruits in trial I-13-6701-2

	Symptoms		**blotchy**		**marble**		**damaged fruits**		**deformed**	
	Rating Type		fruits		fruits		fruits		fruits	
	Rating Unit		%		%		%		%	
Trt	A1	A2								
1	-	agEU+agCH	2.5	a	0.25	a	4.56	a	2.1	a
2	-	-	0.1	b	0.0	c	0.62	c	0.1	b
3	V10	agEU+agCH	0.4	b	0.0	c	1.23	b	0.1	c
4	V10	-	0.6	b	0.0	c	0.78	bc	0.1	c
5	VC	agCH	0.5	b	0.05	b	1.06	bc	0.1	c
6	VX	agEU	0.2	b	0.0	c	0.76	bc	0.1	c

	Symptoms		**blossom end rot**		**open fruits**		**damage calyx**	
	Rating Type		fruits		fruits			
	Rating Unit		%		%		%	
Trt	A1	A2						
1	-	agEU+agCH	0.0	a	0.37	a	16	a
2	-	-	0.0	a	0.0	c	0	b
3	V10	agEU+agCH	0.0	a	0.0	c	0	b
4	V10	-	0.0	a	0.0	c	0	b
5	VC	agCH	0.0	a	0.03	b	0	b
6	VX	agEU	0.0	a	0.0	c	0	b

A1 (010213): mild virus, A2 (220313): aggressive virus
A1: - = water sprayed

As shown in Table 13a, a limited number of fruits were blotchy, damaged, deformed or displayed a damaged calyx, including treatment 1. Although, the number of fruits with PepMV related symptoms was slightly reduced in treatments 3 till 6 when compared with treatment 1.

Table 13b. PepMV related symptoms on fruits per tomato cultivar in trial I-13-6701-2

Symptoms	**blotchy**		**marble**		**damaged fruits**		**deformed**	
Rating Type	%		%		%		%	
Cultivar								
[redacted]	0.002	b	0.0000	b	0.004	c	0.001	b
[redacted]	0.011	a	0.0007	a	0.025	a	0.005	a
[redacted]	0.009	a	0.0010	a	0.015	b	0.006	a
[redacted]	0.012	a	0.0007	a	0.029	a	0.008	a

Symptoms	**blossom end rot**		**open fruits**		**damage calyx**	
Rating Type	%		%		%	
Cultivar						
[redacted]	0.00000	b	0.0000	c	0.004	c
[redacted]	0.00022	ab	0.0014	a	0.025	a
[redacted]	0.00015	ab	0.0012	a	0.015	b
[redacted]	0.00038	a	0.0006	b	0.029	a

Fruit symptoms hardly differ between the different tomato cultivars, but in general PepMV related symptoms were less in cultivar [redacted]

Yield

Assessments on yield were carried out by counting and weighing the number of harvested fruits. Figures are presented in Table 14a. In Table 14b, yield per tomato cultivar is presented.

Table 14a. Total number and weight of fruits (n= 20 plants) in trial I-13-6701-2

	Rating Type		YIELD					
	Rating Unit		NUMBER		WEIGHT		AVG fruit weight	
			total		kg		g	
Trt	A1	A2						
1	-	agEU+agCH	425	a	36	a	93	b
2	-	-	431	a	41	a	105	a
3	V10	agEU+agCH	428	a	40	a	108	a
4	V10	-	406	a	37	a	105	a
5	VC	agCH	427	a	39	a	108	a
6	VX	agEU	422	a	39	a	103	a

A1 (010213): mild virus, A2 (220313): aggressive virus
A1: - = water sprayed

The number of fruits as well as the total weight of the harvested fruits did not differ between plants treated with attenuated viruses (treatments 3 till 6) and plants treated with only the aggressive isolate (treatment 1). However, the AVG fruit weight was in treatments 2 till 6 significantly higher than in treatment 1. Probably the leaf area of the plants treated with the aggressive isolate (-/agEU+agCH) was too low (due to heavy necrosis) to intercept enough light for photosynthesis and thus for growth and fruit production.

Table 14b. Total number and weight of fruits per tomato cultivar in trial I-13-6701-2

	YIELD					
Rating Type	NUMBER		WEIGHT		AVG fruit weight	
Rating Unit	total		kg		g	
[redacted]	664	a	25	d	37	d
[redacted]	347	bc	43	b	123	b
[redacted]	371	b	52	a	139	a
[redacted]	311	c	35	c	114	c

The number of fruits of cultivar [redacted] was significantly higher than in the other cultivars, but the weight was significantly lower. [redacted] is a cocktail tomato. The weight of cultivar [redacted] was significantly higher than in [redacted]

Crop safety

No stunting was observed during the trial.

Crop condition

Figures on crop condition are presented in Table 15.

Table 15. Crop condition (10-1) in trial I-13-6701-2

	Desription		**Vigor**									
	Week		14	16	17	18	19	20	21	22	23	24
Trt	A1	A2										
1	-	agEU + agCH	4.5	4.5	4.5	4.6	5	4.5	3.5	4	4	3.5
2	-	-	8	9	8	9	8.5	8.5	8.5	8	8.5	8
3	V10	agEU + agCH	7.5	8	8	8.5	8.5	8	7.5	7.5	8	7.5
4	V10	-	7.5	7.5	7.5	8	8	8	8	7.5	8	7.5
5	VC	agCH	7.5	8	8	8.5	8.5	8	7.5	7.5	7.9	7.5
6	VX	agEU	8	8	8	8.5	8	8	7.5	7.5	8	7.5

A1 (010213): mild virus, A2 (210313): aggressive virus
A1: - = water sprayed

Crop condition in treatment 1 with a single infection of agEU + agCH became quite worse due to severe symptoms of necrosis in the apical leaves and nettle head. Crop condition in all other treatments was reasonable to good (score 8).

Presence of PepMV

By means of real-time PCR the presence of the correct viral strains after the second application was determined. The presence of the mild variants and the presence of the challenge isolates in the 'cross-protection' treatments was confirmed.

3.5 Trial site details I-13-6701-3

Trial location

Location:	[redacted]	GPS north latitude: GPS east longitude:	[redacted] [redacted]
Street: Province: Country:	[redacted] [redacted] [redacted]		

Trial lay-out

ROW 2		4		6		8		10		12		14		16		18
L	PEPPER	L	PEPPER	L	PEPPER	L	PEPPER	L	PEPPER	L	PEPPER	L	PEPPER	L	PEPPER	L
K	PEPPER	K	PEPPER	K	PEPPER	K	PEPPER	K	PEPPER	K	PEPPER	K	PEPPER	K	PEPPER	K
E	PEPPER	E	PEPPER	E	PEPPER	E	PEPPER	E	PEPPER	E	PEPPER	E	PEPPER	E	PEPPER	E
B	PEPPER	B	PEPPER	B	PEPPER	B	PEPPER	B	PEPPER	B	PEPPER	B	PEPPER	B	PEPPER	B

[redacted]

Row 2: water/untreated
Row 4: V10/untreated
Row 6: VX1/agEU
Row 8: VC1/agCH
Row 10: V10/agEU+agCH
Row 12: water/agEU+agCH

Cultural conditions of the trial site

Soil type:	Rockwool		

Crop:	Tomato	Target temperature:	Day: 20°C
Cultivar:	[redacted]		Night: 18°C
Plot size:	26 plants	Lit:	No

Data on crop and climatic conditions during the applications

Application date ('13)	0102	2103
Application number	A1	A2
Treatments sprayed	1-6	1-6
Interval (weeks)	-	7
Crop conditions		
Crop stage[1])	12-13	51
Wetness of foliage	dry	dry
Wetness of soil surface	moist	moist
Climatic conditions		
Temperature (ºC)	20	23
Relative humidity (%)	75-80	84
Weather type	cloudy	intermittent cloudy
Cloud cover (%)	90	100

[1]) BBCH growth stage scale, see appendix 2.

Test site maintenance

Applied chemicals during trial period		
Date	Product	Rate
three times	Vertimec (abamectin)	100 ml/100 L
Irrigation during trial period		
Date	Method	Amount
daily	trickle irrigation	0.4-11.6 L/m^2

3.6 Results I-13-6701-3

All plants inoculated with PepMV were ELISA positive but the non-infected control (all tomato cultivars) was contaminated with V10 (VX1+VC1).

PepMV related symptoms on tomato

The figures for the PepMV related symptoms on the apical leaves and foliage per tomato cultivar are given in Table 16. Furthermore, as soon as fruit setting occurred, assessments on PepMV related symptoms on fruits was carried out.

Table 16: Symptom scores on tomato in trial I-13-6701-3 (n= 26 plants).

Description			**Nettle head**							
Rating Date			120413		190413		260413		030513	
Rating Type			PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)									
-	agEU+agCH		15	100	10	100	10	100	5	100
-			30	100	30	100	30	100	15	100
-			20	100	20	100	20	100	15	100
-			10	100	30	100	40	100	30	100
-	-		0	0	0	0	5	100	0	0
-			0	0	5	100	10	100	0	0
-			0	0	0	0	10	100	0	0
-			0	0	0	0	5	100	5	100
V10	agEU+agCH		0	0	10	100	15	100	0	0
V10			10	100	10	100	20	100	0	0
V10			10	100	10	100	20	100	0	0
V10			5	100	10	100	10	100	0	0
V10	-		0	0	0	0	10	100	0	0
V10			10	100	5	100	15	100	0	0
V10			10	100	5	100	10	100	0	0
V10			5	100	5	100	10	100	0	0
VC	agCH		0	0	10	100	10	100	0	0
VC			10	100	10	100	10	100	0	0
VC			5	100	10	100	20	100	0	0
VC			5	100	10	100	10	100	0	0
VX	agEU		0	0	10	100	10	100	0	0
VX			5	100	10	100	5	100	0	0
VX			5	100	10	100	15	100	0	0
VX			5	100	10	100	5	100	0	0

A1 (010213): mild virus, A2 (210313): aggressive virus
A1: - = water sprayed

Continued Table 16: Symptom scores on tomato in trial I-13-6701-3 (n= 26 plants).

Description			**Nettle head**			
Rating Date			100513		240513	
Rating Type			PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)					
-	agEU+agCH		5	100	60	100
-			10	100	90	100
-			10	100	80	100
-			20	100	90	100
-	-		0	0	0	0
-			0	0	0	0
-			0	0	0	0
-			0	0	0	0
V10	agEU+agCH		0	0	0	0
V10			0	0	25	10
V10			0	0	15	50
V10			0	0	40	15
V10	-		0	0	0	0
V10			0	0	0	0
V10			0	0	30	70
V10			0	0	0	0
VC	agCH		0	0	0	0
VC			0	0	0	0
VC			0	0	0	0
VC			0	0	0	0
VX	agEU		0	0	0	0
VX			0	0	0	0
VX			0	0	0	0
VX			0	0	5	100

A1 (010213): mild virus, A2 (210313): aggressive virus
A1: - = water sprayed

Continued Table 16: Symptom scores on tomato in trial I-13-6701-3 (n= 26 plants).

Description			**Mosaic**							
Rating Date			120413		190413		260413		030513	
Rating Type			PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)									
-	agEU+agCH		0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-	-		0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
V10	agEU+agCH		0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10	-		0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
VC	agCH		0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VX	agEU		0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0

A1 (010213): mild virus, A2 (210313): aggressive virus

A1: - = water sprayed

Continued Table 16: Symptom scores on tomato in trial I-13-6701-3 (n= 26 plants).

Description			**Mosaic**			
Rating Date			100513		240513	
Rating Type			PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)					
-	agEU+agCH		0	0	0	0
-			0	0	0	0
-			0	0	0	0
-			0	0	0	0
-	-		0	0	0	0
-			0	0	0	0
-			0	0	0	0
-			0	0	0	0
V10	agEU+agCH		0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10	-		0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
VC	agCH		0	0	0	0
VC			0	0	0	0
VC			0	0	0	0
VC			0	0	0	0
VX	agEU		0	0	0	0
VX			0	0	0	0
VX			0	0	0	0
VX			0	0	0	0

A1 (010213): mild virus, A2 (210313): aggressive virus
A1: - = water sprayed

Continued Table 16: Symptom scores on tomato in trial I-13-6701-3 (n= 26 plants).

Description			**Yellow spots**							
Rating Date			120413		190413		260413		030513	
Rating Type			PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)									
-	agEU+agCH		0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-	-		0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
V10	agEU+agCH		0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10	-		0.01	10	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
VC	agCH		0.01	10	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			0.01	20	0	0	0	0	0	0
VC			0.01	50	0	0	0	0	0	0
VX	agEU		0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0.01	10	0	0	0	0	0	0

A1 (010213): mild virus, A2 (210313): aggressive virus

A1: - = water sprayed

Continued Table 16: Symptom scores on tomato in trial I-13-6701-3 (n= 26 plants).

Description			**Yellow spots**			
Rating Date			100513		240513	
Rating Type			PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)					
-	agEU+agCH		0	0	0	0
-			0	0	0	0
-			0	0	0	0
-			0	0	0	0
-	-		0	0	0	0
-			0	0	0	0
-			0	0	0	0
-			0	0	0	0
V10	agEU+agCH		0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10	-		0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
VC	agCH		0	0	0	0
VC			0	0	0	0
VC			0	0	0	0
VC			0	0	0	0
VX	agEU		0	0	0	0
VX			0	0	0	0
VX			0	0	0	0
VX			0	0	0	0

A1 (010213): mild virus, A2 (210313): aggressive virus

A1: - = water sprayed

Continued Table 16: Symptom scores on tomato in trial I-13-6701-3 (n= 26 plants).

Description			**Necrosis leaf**							
Rating Date			120413		190413		260413		030513	
Rating Type			PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)									
-	agEU+agCH		1	100	10	100	5	100	5	100
-			7	100	25	100	30	100	20	100
-			2	100	20	100	10	100	10	100
-			5	100	30	100	30	100	20	100
-	-		0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
V10	agEU+agCH		0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10	-		0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
VC	agCH		0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VX	agEU		0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0

A1 (010213): mild virus, A2 (210313): aggressive virus

A1: - = water sprayed

Continued Table 16: Symptom scores on tomato in trial I-13-6701-3 (n= 26 plants).

Description			**Necrosis leaf**			
Rating Date			100513		240513	
Rating Type			PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)					
-	agEU+agCH		2	100	20	100
-			20	100	80	100
-			10	100	40	100
-			10	100	70	100
-	-		0	0	0	0
-			0	0	0	0
-			0	0	0	0
-			0	0	0	0
V10	agEU+agCH		0	0	0	0
V10			0	0	5	10
V10			0	0	5	25
V10			0	0	25	15
V10	-		0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
VC	agCH		0	0	0	0
VC			0	0	0	0
VC			0	0	0	0
VC			0	0	0	0
VX	agEU		0	0	0.1	88
VX			0	0	0.1	97
VX			0	0	0.1	100
VX			0	0	1	88

A1 (010213): mild virus, A2 (210313): aggressive virus
A1: - = water sprayed

Continued Table 16: Symptom scores on tomato in trial I-13-6701-3 (n= 26 plants).

Description			**Necrosis stem**							
Rating Date			120413		190413		260413		030513	
Rating Type			PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC	PESSEV	PESINC
Rating Unit			% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)									
-	agEU+agCH		0	0	5	100	0	0	0	0
-			2	100	10	100	5	100	0	0
-			1	100	10	100	5	100	0	0
-			2	100	10	100	10	100	0	0
-	-		0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
-			0	0	0	0	0	0	0	0
V10	agEU+agCH		0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10	-		0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
V10			0	0	0	0	0	0	0	0
VC	agCH		0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VC			0	0	0	0	0	0	0	0
VX	agEU		0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0
VX			0	0	0	0	0	0	0	0

A1 (010213): mild virus, A2 (210313): aggressive virus

A1: - = water sprayed

Continued Table 16: Symptom scores on tomato in trial I-13-6701-3 (n= 26 plants).

Description			**Necrosis stem**			
Rating Date			100513		240513	
Rating Type			PESSEV	PESINC	PESSEV	PESINC
Rating Unit		[redacted]	AREA	%PLANTS	% AREA	%PLANTS
Trt (A1)	Treatment (A2)					
-	agEU+agCH		0	0	0	0
-			0	0	0	0
-			0	0	0	0
-			0	0	0	0
-	-		0	0	0	0
-			0	0	0	0
-			0	0	0	0
-			0	0	0	0
V10	agEU+agCH		0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10	-		0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
V10			0	0	0	0
VC	agCH		0	0	0	0
VC			0	0	0	0
VC			0	0	0	0
VC			0	0	0	0
VX	agEU		0	0	0	0
VX			0	0	0	0
VX			0	0	0	0
VX			0	0	0	0

A1 (010213): mild virus, A2 (210313): aggressive virus
A1: - = water sprayed

As shown in Table 16, PepMV symptoms were visible in the untreated control treatment due to a contamination with V10.

Plants which were inoculated with attenuated isolates of PepMV (V10, VC1 and VX1) did not show pepMV related symptoms. After inoculation of these plants with aggressive viruses, mild symptoms of mainly nettle head remained visible but symptoms became less evident as the growing season progressed. More severe PepMV symptoms were visible in plants that were only treated with the aggressive virus when compared with cross-protected plants. Nettle head and necrosis (leaf and stem) was visible and remained visible till the end of the trial. Minor differences in PepMV symptoms occurred between the different tomato cultivars. In Table 17 the average symptom scores (expected values from statistic model which come close to calculated values) throughout the trial are given.

Table 17. Average symptom scores on the apical leaves in trial I-13-6701-3

	Symptom		**Nettle head**	**Mosaic**	**Necrosis leaf**	**Necrosis stem**
	Rating Type		PESSEV area	PESSEV area	PESSEV area	PESSEV area
	Rating Unit		%	%	%	%
Trt	A1	A2				
1	-	agEU+agCH	29 a	0 a	16 a	19 a
2*	-	-	2 d	0 a	0 c	0 b
3	V10	agEU+agCH	9 b	0 a	1 b	0 b
4	V10	-	4 c	0 a	0 c	0 b
5	VC	agCH	5 c	0 a	0 c	0 b
6	VX	agEU	4 c	0 a	0 c	0 b

	Symptom		**Yellow spots**	**Chlorosis**
	Rating Type		PESSEV area	PESSEV area
	Rating Unit		%	%
Trt	A1			
1	-	agEU+agCH	0.00000 c	0 a
2*	-	-	0.00000 c	0 a
3	V10	agEU+agCH	0.00000 c	0 a
4	V10	-	0.00042 b	0 a
5	VC	agCH	0.00125 a	0 a
6	VX	agEU	0.00042 b	0 a

A1 (010213): mild virus, A2 (210313): aggressive virus, * contaminated with V10
A1: - = water sprayed

As shown in Table 17, PepMV related symptoms (nettle head and necrosis) were significantly reduced in treatments 3 till 6. Cross-protection with mild viruses reduces the leaf symptoms caused by more aggressive isolates.

One assessment on flowering of trusses was carried out during the trial. In Table 18a the number of trusses is presented per treatment and Table 18b per tomato cultivar. Flowering is expressed in decimal figures. The number represents the trusses that flower. Decimals indicate the part of the youngest truss that flowers.

Table 18a. Flowering and setting of trusses in trial I-13-6701-3

	Week		16	16
	Rating Type		flowering	setting
	Rating Unit		NUMBER	NUMBER
Trt	A1	A2		
1	-	agEU+agCH	6.61 a	7.26 a
2*	-	-	6.36 abc	6.95 abc
3	V10	agEU+agCH	6.13 bcd	6.75 bc
4	V10	-	6.01 bcd	6.68 bc
5	VC	agCH	6.23 bcd	6.91 bc
6	VX	agEU	6.46 ab	7.07 ab

A1 (010213): mild virus, A2 (210313): aggressive virus, * contaminated with V10
A1: - = water sprayed

Table 18b. Flowering and setting of trusses per tomato cultivar in trial I-12-6701-3

Week Rating Type Cultivar	16 flowering NUMBER		16 setting NUMBER	
[redacted]	7.46	a	8.19	a
[redacted]	6.03	b	6.67	b
[redacted]	6.05	b	6.66	b
[redacted]	5.65	c	6.22	c

As shown in Table 18a, flowering in treatmenst 3 till 6 was (significantly) lower than in treatment 1. Flowering of trusses was in cultivar [redacted] the highest (see table 18b).

Fruit symptoms

As soon as fruits had developed, assessments were carried out on PepMV related symptoms. Figures for the average percentage of affected fruits is presented in Table 19a. Affected fruits per tomato cultivar is presented in Table 19b.

Table 19a. PepMV related symptoms on fruits in trial I-13-6701-3

	Symptoms Rating Type Rating Unit		**blotchy** fruits %		**marble** fruits %		**damaged fruits** fruits %		**deformed** fruits %	
Trt	A1	A2								
1	-	agEU+agCH	8.7	a	2.1	a	1.09	ab	0	a
2*	-	-	3.6	b	0.9	b	1.21	ab	0	a
3	V10	agEU+agCH	2.9	b	0.1	c	0.85	ab	0	a
4	V10	-	0.9	c	0.0	c	0.88	ab	0	a
5	VC	agCH	1.7	bc	0.0	c	0.45	b	0	a
6	VX	agEU	2.5	bc	1.9	a	1.28	a	0	a

	Symptoms Rating Type Rating Unit		**blossom end rot** fruits %		**open fruits** fruits %		**damage stem trusses** % 	
Trt	A1	A2						
1	-	agEU+agCH	11.78	a	0	a	0.94	a
2*	-	-	2.87	c	0	a	0	c
3	V10	agEU+agCH	3.69	c	0	a	0	c
4	V10	-	2.90	c	0	a	0	c
5	VC	agCH	5.40	bc	0	a	0	c
6	VX	agEU	7.87	b	0	a	0.31	b

A1 (010213): mild virus, A2 (210313): aggressive virus, * contaminated with V10
A1: - = water sprayed

As shown in Table 19a, a limited number of fruits were blotchy, showed marbling, were damaged or displayed blossom end rot, including treatment 1. Although, the number of blotchy and marbled fruits and the number of fruits which displayed blossom end rot was slightly reduced in treatments 3 till 6 when compared with treatment 1.

Table 19b. PepMV related symptoms on fruits per tomato cultivar in trial I-13-6701-3

Symptoms Rating Type Cultivar	**blotchy** %		**marble** %		**damaged fruits** %	
[redacted]	4.7	a	0.3	b	0.31	b
[redacted]	2.3	b	2.1	a	1.61	a
[redacted]	3.1	ab	0.4	b	1.45	a
[redacted]	1.5	b	1.7	a	1.55	a

Symptoms Rating Type Cultivar	**blossom end rot** %		**open fruits** %		**damage stem trusses** %	
[redacted]	0.38	c	0.0	a	0	c
[redacted]	5.17	b	0.0	a	0.63	a
[redacted]	2.58	b	0.0	a	0	c
[redacted]	27.84	a	0.0	a	0.21	b

It seems that the number of [redacted] damaged and open fruits in cultivar E[redacted] was somewhat higher than in the other varieties. A significantly higher percentage of fruits which displayed blossom end rot was observed in cultivar L[redacted]

Yield

Assessments on yield were carried out by counting and weighing the number of harvested fruits. Figures are presented in Table 20a. In Table 20b, yield per tomato cultivar is presented.

Table 20a. Total number and weight of fruits (n= 26 plants) in trial I-13-6701-3

	Rating Type Rating Unit		YIELD NUMBER total		WEIGHT kg		AVG fruit weight g	
Trt	A1	A2						
1	-	agEU+agCH	872	a	97	a	131	bc
2*	-	-	697	b	72	c	125	bc
3	V10	agEU+agCH	831	a	90	ab	141	ab
4	V10	-	769	ab	85	b	136	ab
5	VC	agCH	813	a	95	ab	140	ab
6	VX	agEU	764	ab	86	ab	143	a

A1 (010213): mild virus, A2 (210313): aggressive virus, * contaminated with V10
A1: - = water sprayed

The number of fruits as well as the weight of the harvested fruits in plants treated with attenuated viruses (treatments 3 till 6) was (significantly) higher than in plants treated with only the aggressive isolate (treatment 1).

Table 20b. Total number and weight of fruits per tomato cultivar in trial I-13-6701-3

Rating Type	YIELD NUMBER		WEIGHT		AVG fruit weight	
Rating Unit	total		kg		g	
Brioso	1500	a	73	bc	49	d
Endeavour	557	bc	93	ab	167	b
Komeett	618	b	115	a	186	a
Levanzo	489	c	70	bc	143	c

The number of fruits of cultivar [redacted] was significantly higher than in the other cultivars, but the weight was (significantly) lower. [redacted]. The weight of cultivar [redacted] was for AVG fruit weight significantly higher than in [redacted].

Crop safety

No stunting was observed during the trial.

Crop condition

Figures on crop condition are presented in Table 21.

Table 21. Crop condition (10-1) in trial I-13-6701-3

	Desription		**Vigor**					
	Date		120413	190413	260413	030513	100513	240513
Trt	A1	A2						
1	-	agEU + agCH	5.5	6.0	4.8	5.8	5.8	2.8
2	-	-	7.8	8.0	7.8	8.0	8.0	7.0
3	V10	agEU + agCH	7.5	8.0	7.3	8.0	8.0	6.8
4	V10	-	7.3	8.0	8.0	8.0	8.0	7.0
5	VC	agCH	7.3	8.0	7.8	8.0	8.0	7.8
6	VX	agEU	6.8	8.0	7.8	8.0	8.0	6.0

A1 (010213): mild virus, A2 (210313): aggressive virus, * contaminated with V10
A1: - = water sprayed

Crop condition in treatment 1 with a single infection of agEU + agCH became quite worse due to severe symptoms of necrosis in the apical leaves and nettle head. Crop condition in all other treatments was reasonable to good (score 7-8).

Presence of PepMV

By means of real-time PCR the presence of the correct viral strains after the second application was determined. The presence of the mild variants and the presence of the challenge isolates in the 'cross-protection' treatments was confirmed. An accidental contamination with V10 occurred in all cultivars in the treatment where no viruses were introduced.

4 CONCLUSIONS

In 2013 a project was carried out in The Netherlands to test the efficacy of attenuated isolates of *Pepino mosaic virus* for cross-protection in protected tomato. Three trials were carried out, from the results obtained the following conclusions can be drawn:

PepMV related symptoms on leaves and fruits were strongly reduced in plants infected with attenuated virus isolates before treating the plants with aggressive viral isolates. No clear reduction of flowering, setting of trusses and finally yield occurred after the inoculation with the aggressive isolate. On the other hand also no yield loss occurred in plants that were treated with one of the attenuated isolates. The yield of the cross-protected plants was comparable with the yield of the untreated control plants and comparable or higher than the yield in plants treated with the aggressive isolates. Quality of the harvested fruits was not effected when plants were cross-protected by mild virus isolates.

Some stunting of the plants was observed in all viral objects with the most severe symptoms in the virulent virus control agEU + agCH.

5 TEST FACILITY [redacted]

De Bredelaar is officially recognised as an organisation for efficacy testing (see appendix 3) as has been laid down in the “Regulation Crop Protection Products and Biocides” of September 26, 2007.

All raw data of this project will be stored at [redacted]. The archived data and documents will be retained for a period of 10 years. Thereafter the sponsor will be contacted. No archived material will be disposed of without the permission of the sponsor.

APPENDIX 1 GEP CERTIFICATE

Ministerie van Landbouw, Natuur en Voedselkwaliteit

landbouw, natuur en voedselkwaliteit

This is to declare that, in conformity with the request of November 22, 2007

[redacted]

[redacted]

HAS OFFICIALLY BEEN RECOGNISED AS AN ORGANISATION FOR EFFICACY TESTING
on January 17, 2008

as has been laid down in the "Regeling gewasbeschermingsmiddelen en biociden" (Regulation Crop Protection Products and Biocides) of September 26, 2007 (Staatscourant 2007, 386)

This recognition will commence on January 22, 2008 and expire on January 22, 2014

Wageningen, January 17, 2008

For the Minister of Agriculture,
Nature and Food Quality,

Mr. ing. H.A. Harmsma

Acting Director Plant Protection Service

APPENDIX 2 BBCH GROWTH STAGE SCALE

Code		Description
0		**Germination, sprouting, bud development**
	00	Dry seed
	01	Beginning of seed imbibition
	03	Seed imbibition complete
	05	Radicle (root) emerged from seed
	06	Elongation of radicle, form. of root hairs
	07	Hypocotyl breaking through seed coat
	08	Hypocotyl growing towards soil surface
	09	Emergergence: cotyl. break through soil surf.
1		**Leaf development (main shoot)**
	10	Cotyledons completely unfolded
	11	1 true leaf, leaf pair or whorl unfolded
	12	2 true leaves, leaf pairs or whorls unfolded
	13	3 true leaves, leaf pairs or whorls unfolded
	14	4 true leaves, leaf pairs or whorls unfolded
	15	5 true leaves, leaf pairs or whorls unfolded
	16	6 true leaves, leaf pairs or whorls unfolded
	17	7 true leaves, leaf pairs or whorls unfolded
	18	8 true leaves, leaf pairs or whorls unfolded
	19	9 or m. true leaves, l. pairs, whorls unfolded
2		**Formation of side shoots**
	21	First side shoot visible
	22	2 side shoots visible
	23	3 side shoots visible
	24	4 side shoots visible
	25	5 side shoots visible
	26	6 side shoots visible
	27	7 side shoots visible
	28	8 side shoots visible
	29	9 or more side shoots visible
3		**Stem elong. or rosette growth, shoot dev.**
	31	Stem (rosette) 10% of final lenght (diam.)
	32	Stem (rosette) 20% of final lenght (diam.)
	33	Stem (rosette) 30% of final lenght (diam.)
	34	Stem (rosette) 40% of final lenght (diam.)
	35	Stem (rosette) 50% of final lenght (diam.)
	36	Stem (rosette) 60% of final lenght (diam.)
	37	Stem (rosette) 70% of final lenght (diam.)
	38	Stem (rosette) 80% of final lenght (diam.)
	39	Max. stem lenght or rosette diam. reached

Code		Description
4		**Devel. of harvestable vegetat. plant parts**
	41	Harvest. veg. plant parts begin to develop
	43	Harvest. veg. plant parts 30% of final size
	45	Harvest. veg. plant parts 50% of final size
	47	Harvest. veg. plant parts 70% of final size
	49	Harvest. veg. plant parts have final size
5		**Inflorescence emergence**
	51	Inflorescence or flower buds visible
	55	1. individual flowers vis. (still closed)
	59	1. flower pedals vis. (in petalled forms)
6		**Flowering (main shoot)**
	60	First flowers open
	61	10% of flow. open or 10% of plants in bloom
	63	30% of flow. open or 30% of plants in bloom
	65	Full flow.: 50% flow. open/50% pl. in bloom
	67	Flower. finishing: majority of petals fallen
	69	End of flowering: fruit set visible
7		**Development of fruit**
	71	10% fruits h. final size/fr. 10% of final size
	73	30% fruits h. final size/fr. 30% of final size
	75	50% fruits h. final size/fr. 50% of final size
	77	70% fruits h. final size/fr. 70% of final size
	79	Nearly all fruits have reached final size
8		**Ripening or maturity of fruit and seed**
	81	Beginning of ripening or fruit colouration
	85	Advanced ripening or fruit colouration
	89	Fully ripe
9		**Senescence, beginning of dormancy**
	93	Leaves begin to change colour or fall
	95	50% of leaves discoloured or fallen
	97	End of leaf fall: plants dead or dormant
	99	Harvested product

APPENDIX 3 CLIMATIC DATA

Climatic data registered by means of a datalogger.

Location I-13-6701-1[redacted]

Date '13	Compartment 1		Compartment 3		
	mean temp. (°C)	RH (%)	mean temp. (°C)	RH(%)	daily light sum (J/cm²)
21/2	17.6	58	18.4	46	718
22/2	16.8	63	16.9	49	654
23/2	14.7	92	15.4	48	538
24/2	17.4	100	19.0	48	394
25/2	18.3	84	18.8	55	139
26/2	18.8	74	18.6	57	159
27/2	18.0	71	18.9	54	287
28/2	19.0	73	19.0	57	230
1/3	18.9	78	18.4	61	572
2/3	19.0	78	19.0	63	251
3/3	19.0	81	19.0	63	360
4/3	17.9	70	18.4	57	268
5/3	20.0	70	19.0	59	1157
6/3	19.2	81	19.2	69	1098
7/3	19.0	84	18.7	74	617
8/3	18.0	86	20.2	79	556
9/3	17.9	79	18.6	70	676
10/3	18.0	70	17.9	60	171
11/3	19.0	70	15.0	57	153
12/3	15.8	72	14.7	61	467
13/3	18.3	72	15.7	59	914
14/3	18.1	72	15.9	63	1052
15/3	17.8	77	17.9	64	1026
16/3	19.7	80	18.5	69	349
17/3	18.4	86	18.6	71	567
18/3	17.6	82	18.1	75	599
19/3	18.1	85	19.5	71	909
20/3	18.5	84	18.0	71	438
21/3	19.5	78	18.1	71	584
22/3	19.6	80	20.0	68	499
23/3	18.2	76	18.3	67	1125
24/3	18.8	76	16.3	67	743
25/3	17.4	76	17.2	70	528
26/3	18.0	77	17.7	65	1392
27/3	20.8	75	21.7	67	1656
28/3	19.4	73	18.0	67	1664
29/3	18.3	76	18.4	69	1083
30/3	18.9	77	20.3	67	792
31/3	19.8	80	17.3	75	691

CONTINUED: Climatic data registered by means of a datalogger.

Location I-13-6701-1: [redacted]

Dat e '13	Compartment 1		Compartment 3		
	mean temp. (°C)	RH (%)	mean temp. (°C)	RH(%)	daily light sum (J/cm²)
1/4	18.8	80	16.8	72	810
2/4	19.9	74	17.2	69	1669
3/4	18.8	77	19.0	74	1859
4/4	19.3	80	19.0	74	1169
5/4	19.8	88	20.2	76	566
6/4	21.8	89	19.0	83	974
7/4	19.4	86	21.8	79	1398
8/4	18.0	87	19.2	77	1473
9/4	18.1	91	18.9	85	1476
10/4	19.6	95	19.1	90	779
11/4	19.4	90	19.1	84	558
12/4	18.6	91	19.1	87	304
13/4	21.7	91	19.6	87	662
14/4	19.9	89	20.3	85	1204
15/4	20.0	92	20.6	88	1311
16/4	19.2	88	20.3	88	1182
17/4	20.2	86	18.3	81	894
18/4	22.6	81	20.1	75	1049
19/4	19.4	75	18.8	70	2121
20/4	18.7	72	19.4	65	1368
21/4	19.8	73	18.0	65	2176
22/4	18.4	72	19.2	66	2079
23/4	18.5	81	19.2	75	1935
24/4	20.3	78	21.4	72	939
25/4	20.8	81	20.9	77	1883
26/4	18.4	83	17.7	79	1404
27/4	18.8	76	20.0	71	295
28/4	17.0	75	19.6	72	2084
29/4	18.7	75	19.1	72	2000
30/4	18.5	80	16.3	75	1792
1/5	16.8	74	16.8	69	1736
2/5	19.9	83	19.4	79	2343
3/5	18.1	82	18.4	78	907
4/5	16.0	83	20.2	77	2214
5/5	18.8	84	18.7	78	2399
6/5	17.0	83	18.2	76	2358
7/5	19.9	84	17.5	80	2240
8/5	18.8	91	18.8	87	1741
9/5	23.7	85	22.0	80	1227

CONTINUED: Climatic data registered by means of a datalogger.

Location I-13-6701-1: [redacted]

Dat e '13	Compartment 1		Compartment 3		
	mean temp. (°C)	RH (%)	mean temp. (°C)	RH(%)	daily light sum (J/cm²)
10/5	18.1	82	17.0	77	2037
11/5	19.0	87	20.0	84	1305
12/5	19.2	85	18.1	82	1029
13/5	16.6	88	18.8	85	1284
14/5	16.6	91	18.7	87	1116
15/5	18.3	87	17.9	84	1046
16/5	17.7	88	17.0	86	1709
17/5	20.3	91	19.8	89	389
18/5	20.5	94	17.8	90	342
19/5	22.0	83	19.8	82	618
20/5	17.3	93	18.6	92	1908
21/5	18.6	91	17.5	90	299
22/5	17.2	86	18.1	86	345
23/5	19.8	82	18.7	84	1433
24/5	18.5	83	19.2	87	1686
25/5	17.0	82	18.3	83	1167
26/5	20.5	84	18.9	86	1767
27/5	18.3	75	22.0	80	1624
28/5	20.5	72	19.0	74	2741
29/5	18.3	86	20.5	86	2350
30/5	18.3	91	19.3	89	496
31/5	20.1	84	20.5	82	1075
1/6	19.2	83	20.0	84	2243
2/6	20.3	75	18.6	75	1047
3/6	17.2	79	18.0	80	2803
4/6	17.1	78	18.6	75	1672
5/6	18.7	77	20.1	71	2689
6/6	21.3	76	19.1	74	2596
7/6	23.3	76	18.8	74	2661
8/6	19.0	76	18.0	75	2692
9/6	18.7	83	19.6	80	2684
10/6	18.9	88	18.7	84	1542
11/6	21.0	88	21.7	78	1168
12/6	19.6	95	18.5	83	1813
13/6	18.8	92	17.3	81	946
14/6	19.1	76	16.8	62	1122

CONTINUED: Climatic data registered by means of a datalogger.

Location I-13-6701-2: [redacted]

Date '13	3.04	3.05	3.06	
	mean temp. (°C)	mean temp. (°C)	mean temp. (°C)	daily light sum (W/m²)
22/2	19.98	19.85	19.96	17093
23/2	19.97	19.94	20.00	13693
24/2	19.95	19.75	19.90	5279
25/2	19.99	19.98	19.99	5894
26/2	20.13	20.08	20.05	10896
27/2	19.98	19.97	19.96	7593
28/2	20.29	20.26	20.16	18453
1/3	20.03	20.01	20.00	10377
2/3	20.20	20.15	20.11	13015
3/3	20.06	20.08	20.08	9278
4/3	20.38	20.31	20.04	39982
5/3	20.42	20.24	19.87	37456
6/3	19.90	19.83	19.52	19583
7/3	19.45	19.41	19.31	19342
8/3	19.61	19.60	19.47	23581
9/3	18.82	18.90	18.84	5729
10/3	18.91	18.87	18.84	6567
11/3	18.90	18.86	18.86	15588
12/3	19.21	19.12	19.07	32466
13/3	19.80	19.82	19.80	31214
14/3	19.48	19.44	19.43	34238
15/3	18.89	18.87	18.84	14157
16/3	19.14	19.05	18.99	19425
17/3	19.28	19.23	19.23	21139
18/3	19.61	19.58	19.56	31863
19/3	19.14	19.10	19.06	16705
20/3	19.09	19.00	18.96	18948
21/3	19.18	19.26	19.22	22011
22/3	19.65	19.62	19.60	37704
23/3	19.18	19.13	19.10	26135
24/3	19.01	18.92	18.92	19751
25/3	19.99	19.95	19.92	50345
26/3	20.31	20.21	20.21	57351
27/3	20.40	20.36	20.29	56212
28/3	19.65	19.62	19.58	38353
29/3	20.02	19.96	19.93	28084
30/3	19.31	19.35	19.30	24849
31/3	19.37	19.33	19.32	27755

CONTINUED: Climatic data registered by means of a datalogger.

Location I-13-6701-2: [redacted]

Date '13	3.04	3.05	3.06	
	mean temp. (°C)	mean temp. (°C)	mean temp. (°C)	daily light sum (W/m²)
1/4	20.22	20.15	20.09	56766
2/4	20.72	20.63	20.54	62091
3/4	19.88	19.76	19.69	43136
4/4	19.50	19.41	19.41	18004
5/4	20.04	19.99	19.97	30492
6/4	20.74	20.67	20.60	51648
7/4	21.51	21.62	21.47	51638
8/4	21.36	21.25	21.13	49125
9/4	20.63	20.55	20.49	28100
10/4	19.93	19.93	19.84	20208
11/4	19.65	19.65	19.64	11143
12/4	20.02	20.06	19.98	23097
13/4	20.86	20.91	20.84	39553
14/4	22.15	21.97	21.75	44917
15/4	21.24	21.36	21.34	38945
16/4	20.89	20.92	20.85	32272
17/4	21.34	21.26	21.03	35750
18/4	21.48	21.57	21.60	71248
19/4	21.02	20.95	20.98	44100
20/4	22.04	21.89	21.82	72982
21/4	21.80	21.73	21.84	66050
22/4	21.81	21.94	22.01	62522
23/4	20.92	21.02	21.05	29084
24/4	21.78	21.81	21.96	65781
25/4	22.10	22.25	22.28	48093
26/4	20.11	20.03	20.07	9479
27/4	21.32	21.26	21.26	59449
28/4	22.02	22.07	22.09	53395
29/4	21.53	21.79	21.91	57160
30/4	21.60	21.53	21.47	56738
1/5	21.34	21.15	21.10	77951
2/5	19.68	19.57	19.49	26366
3/5	20.08	21.49	20.64	74548
4/5	20.43	26.46	20.86	80672
5/5	20.53	26.59	20.83	78316
6/5	20.77	27.04	21.29	75805
7/5	21.79	27.93	21.25	57682
8/5	20.62	25.91	20.32	44366
9/5	20.00	20.21	20.32	74405

CONTINUED: Climatic data registered by means of a datalogger.

Location I-13-6701-2: [redacted]

Date '13	3.04	3.05	3.06	
	mean temp. (°C)	mean temp. (°C)	mean temp. (°C)	daily light sum (W/m²)
10/5	19.96	20.03	20.17	41378
11/5	19.27	19.36	19.39	28719
12/5	19.54	19.69	19.80	39347
13/5	19.60	19.65	19.74	38744
14/5	19.34	19.38	19.39	32683
15/5	19.85	19.83	19.78	57170
16/5	18.94	18.93	18.93	12773
17/5	18.94	18.96	19.03	10930
18/5	19.56	19.58	19.44	20083
19/5	20.14	20.12	19.95	65527
20/5	19.35	19.30	19.33	10143
21/5	19.01	19.04	19.08	9247
22/5	19.25	19.40	19.46	38402
23/5	18.80	19.00	19.07	53236
24/5	18.79	18.72	18.57	39643
25/5	18.60	18.95	18.96	53787
26/5	18.91	19.05	19.15	46859
27/5	19.96	20.04	20.46	91996
28/5	21.48	21.27	20.92	83860
29/5	18.33	18.38	18.32	16964
30/5	19.93	19.91	19.37	36925
31/5	19.32	19.73	20.08	77249
1/6	18.79	18.88	18.92	30185
2/6	19.16	19.58	20.09	94300
3/6	19.24	19.34	19.13	44964
4/6	20.08	20.14	20.49	88725
5/6	21.61	21.51	21.41	94959
6/6	22.37	22.24	22.14	89427
7/6	22.39	22.22	22.01	91483
8/6	20.35	20.13	20.25	89881
9/6	19.52	19.34	19.06	49883
10/6	19.30	19.51	19.20	40121
11/6	20.24	20.27	20.35	59971
12/6	20.39	20.50	20.29	33604
13/6	19.89	19.93	20.04	38252
14/6	19.99	20.11	20.23	64482

CONTINUED: Climatic data registered by means of a datalogger.

Location I-13-6701-3: [redacted]

date	mean temp. (°C)	daily light sum (J/cm²)		date	mean temp. (°C)	daily light sum (J/cm²)	date	mean temp. (°C)	daily light sum (J/cm²)
4/3	20.6	1292		8/4	20.8	1587	13/5	20.3	1216
5/3	20.8	1208		9/4	20	913	14/5	19.8	1125
6/3	20.3	610		10/4	19.6	701	15/5	20.5	1717
7/3	20	606		11/4	19.3	360	16/5	19.1	424
8/3	20.1	740		12/4	20	815	17/5	19	352
9/3	19.4	160		13/4	20.7	1390	18/5	19.7	677
10/3	18.8	204		14/4	21.8	1393	19/5	20.3	2003
11/3	18.5	528		15/4	20.6	1318	20/5	19.1	301
12/3	19	1028		16/4	20.2	1002	21/5	18.8	294
13/3	19.2	1094		17/4	21.5	1144	22/5	19.8	1503
14/3	19	1087		18/4	21	2256	23/5	20.1	1975
15/3	19.5	439		19/4	20.1	1414	24/5	19.8	1303
16/3	20	634		20/4	20.9	2329	25/5	20	1950
17/3	19.9	650		21/4	21	2073	26/5	19.9	1612
18/3	20.3	940		22/4	21.3	1992	27/5	20.9	2866
19/3	20.1	503		23/4	20.5	966	28/5	21.2	2564
20/3	21.1	579		24/4	21.4	2020	29/5	19.5	541
21/3	20.8	618		25/4	20.9	1500	30/5	20.2	1149
22/3	21.1	1232		26/4	18.9	334	31/5	20.6	2499
23/3	20.8	891		27/4	20.1	1851	1/6	19.6	1125
24/3	20.5	668		28/4	20.9	2047	2/6	20.8	2997
25/3	21.5	1646		29/4	20.5	1872	3/6	20	1488
26/3	21.4	1904		30/4	20.2	1715	4/6	20.9	2828
27/3	22	1867		1/5	20.7	2483	5/6	21.3	2874
28/3	21.3	1196		2/5	19.7	818	6/6	21.8	2801
29/3	21	810		3/5	20.7	2281	7/6	22.1	2859
30/3	21.2	921		4/5	21.2	2554			
31/3	21.3	943		5/5	21	2341			
1/4	22	1730		6/5	21.1	2381			
2/4	22.2	2058		7/5	21.6	1815			
3/4	21.8	1276		8/5	21	1349			
4/4	21.4	592		9/5	21.2	2197			
5/4	21.8	1064		10/5	20.5	1480			
6/4	22	1464		11/5	20.1	1054			
7/4	22.5	1733		12/5	20.4	1347			

APPENDIX 4 RAW DATA OF THE ASSESSMENTS

I-13-6701-1: [redacted]

mild	agressief	ras	brandnetel %bladopvl	brandnetel % planten	mozaiek %bladopvl	mozaiek % planten	gele stippen %bladopvl	gele stippen % planten	bladnecrose %bladopvl
geen	agEU + agCH	[redacted]	19,2	71,7	16,7	0,0	0,0	0,0	27,5
			22,5	70,0	16,7	0,0	0,0	0,0	28,3
			21,7	70,0	16,7	0,0	0,0	0,0	27,5
			25,8	68,3	16,7	0,0	0,0	0,0	25,0
	geen		0,0	0,0	0,0	0,0	0,0	0,0	0,2
			0,0	0,0	0,0	0,0	0,0	0,0	0,2
			0,0	0,0	0,0	0,0	0,0	0,0	0,2
			0,0	0,0	0,0	0,0	0,0	0,0	0,2
V10	agEU + agCH		2,5	16,7	0,0	0,0	0,0	0,0	0,0
			2,5	16,7	0,0	0,0	0,0	0,0	0,0
			3,3	16,7	0,0	0,0	0,0	0,0	0,0
			2,5	16,7	0,0	0,0	0,0	0,0	0,0
	geen		1,7	16,7	0,0	0,0	0,0	0,0	0,2
			1,7	17,5	0,0	0,0	0,0	0,0	0,2
			2,5	17,5	0,0	0,0	0,0	0,0	0,2
			0,8	18,3	0,0	0,0	0,0	0,0	0,2
VC	agCH		2,5	16,7	0,0	0,0	0,0	0,0	0,0
			2,5	16,7	0,0	0,0	0,0	0,0	0,0
			2,5	16,7	0,0	0,0	0,0	0,0	0,0
			1,7	16,7	0,0	0,0	0,0	0,0	0,0
VX	agEU		0,0	0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0	0,0

bladnecrose % planten	stengel necrose %bladopvl	stengel necrose % planten	chlorose %bladopvl	chlorose % planten	gewas stand (10-1)	gewas beschadiging (10-1)	groei remming (%)
83,3	9,2	66,7	0,0	0,0	5,7	0,0	7,5
83,3	5,0	66,7	0,0	0,0	5,2	0,0	8,3
83,3	3,7	66,7	0,0	0,0	5,3	0,0	8,3
83,3	5,0	66,7	0,0	0,0	5,3	0,0	8,3
16,7	0,0	0,0	0,0	0,0	7,8	0,0	0,0
16,7	0,0	0,0	0,0	0,0	7,8	0,0	0,0
16,7	0,0	0,0	0,0	0,0	7,8	0,0	0,0
16,7	0,0	0,0	0,0	0,0	7,8	0,0	0,0
0,0	0,0	0,0	0,0	0,0	7,7	0,0	1,7
0,0	0,0	0,0	0,0	0,0	7,7	0,0	1,7
0,0	0,0	0,0	0,0	0,0	7,7	0,0	1,7
0,0	0,0	0,0	0,0	0,0	7,7	0,0	1,7
16,7	0,0	0,0	0,0	0,0	7,7	0,0	0,8
16,7	0,0	0,0	0,0	0,0	7,7	0,0	0,8
16,7	0,0	0,0	0,0	0,0	7,7	0,0	0,8
16,7	0,0	0,0	0,0	0,0	7,7	0,0	0,8
0,0	0,0	0,0	0,0	0,0	7,7	0,0	0,8
0,0	0,0	0,0	0,0	0,0	7,7	0,0	0,8
0,0	0,0	0,0	0,0	0,0	7,7	0,0	0,8
0,0	0,0	0,0	0,0	0,0	7,7	0,0	0,8
0,0	0,0	0,0	0,0	0,0	7,8	0,0	0,0
0,0	0,0	0,0	0,0	0,0	7,8	0,0	0,0
0,0	0,0	0,0	0,0	0,0	7,8	0,0	0,0
0,0	0,0	0,0	0,0	0,0	7,8	0,0	0,0

mild	agressief	brandnetel %bladopvl	brandnetel % planten	mozaiek %bladopvl	mozaiek % planten	gele stippen %bladopvl	gele stippen % planten	bladnecrose %bladopvl	bladnecrose % planten
geen	agEU + agCH	22,3	70,0	16,7	0,0	0,0	0,0	27,1	83,3
	geen	0,0	0,0	0,0	0,0	0,0	0,0	0,2	16,7
V10	agEU + agCH	2,7	16,7	0,0	0,0	0,0	0,0	0,0	0,0
	geen	1,7	17,5	0,0	0,0	0,0	0,0	0,2	16,7
VC	agCH	2,3	16,7	0,0	0,0	0,0	0,0	0,0	0,0
VX	agEU	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

stengel necrose %bladopvl	stengel necrose % planten	chlorose %bladopvl	chlorose % planten	gewas stand (10-1)	groei remming (%)
5,7	66,7	0,0	0,0	5,4	8,1
0,0	0,0	0,0	0,0	7,8	0,0
0,0	0,0	0,0	0,0	7,7	1,7
0,0	0,0	0,0	0,0	7,7	0,8
0,0	0,0	0,0	0,0	7,7	0,8
0,0	0,0	0,0	0,0	7,8	0,0

Sum of vruchten			datum					
mild	agressief	ras	14-mei	21-mei	30-mei	5-jun	12-jun	Grand Total
geen	agEU + agCH	[redacted]	198	213	324	249	0	984
			0	127	165	84	0	376
			15	75	180	131	0	401
			45	109	120	129	0	403
	geen		252	224	291	203	0	970
			5	116	152	85	45	403
			0	83	182	90	50	405
			14	102	164	75	60	415
V10	agEU + agCH		57	270	270	251	146	994
			10	108	101	78	110	407
			0	90	84	136	104	414
			0	85	96	101	131	413
	geen		119	277	252	280	32	960
			5	79	140	80	85	389
			0	100	121	115	65	401
			0	86	127	105	85	403
VC	agCH		274	217	252	229	0	972
			0	110	114	106	70	400
			0	90	95	124	90	399
			21	87	91	117	90	406
VX	agEU		64	262	357	264	16	963
			15	88	136	102	64	405
			0	89	101	121	90	401
			0	72	106	95	105	378

Sum of trossen		ras				
mild	agressief	[redacted]	[redacted]	[redacted]	[redacted]	Grand Total
geen	agEU + agCH	120	80	80	80	360
	geen	120	80	80	80	360
V10	agEU + agCH	120	80	80	80	360
	geen	120	80	80	80	360
VC	agCH	120	80	80	80	360
VX	agEU	120	80	80	76	356
Grand Total		720	480	480	476	2156

Sum of gewicht (kg)			datum					
mild	agressief	ras	14-mei	21-mei	30-mei	5-jun	12-jun	Grand Total
geen	agEU + agCH	[redacted]	5,3	6,9	11,6	8,2	0,0	31,9
			0,0	12,5	19,5	9,5	0,0	41,5
			1,7	8,7	22,1	16,0	0,0	48,6
			3,8	10,0	15,9	14,8	0,0	44,5
	geen		7,2	7,4	10,9	8,2	0,0	33,7
			0,5	12,0	16,8	10,8	5,4	45,6
			0,0	8,9	21,0	10,8	5,4	46,1
			1,4	11,1	18,8	9,2	6,6	47,1
V10	agEU + agCH		1,6	8,2	7,5	10,1	5,3	32,8
			1,0	12,7	11,7	10,4	13,8	49,6
			0,0	12,1	10,5	19,4	14,3	56,2
			0,0	9,6	10,6	11,6	14,9	46,8
	geen		3,8	6,9	10,3	11,2	1,3	33,5
			0,5	11,6	17,6	10,5	11,5	51,7
			0,0	12,1	17,7	15,7	9,1	54,5
			0,0	10,3	14,4	13,6	11,0	49,3
VC	agCH		8,2	7,8	8,4	8,4	0,0	32,9
			0,0	11,7	13,3	13,5	8,8	47,2
			0,0	11,9	12,2	18,2	12,6	54,9
			1,8	9,8	10,9	14,7	12,2	49,4
VX	agEU		1,8	8,5	13,4	9,0	0,6	33,3
			1,6	9,3	15,9	12,7	7,7	47,2
			0,0	11,2	12,7	16,9	11,1	51,8
			0,0	7,5	12,8	11,6	13,8	45,8

Sum of trossen			datum					
mild	agressief	ras	14-mei	21-mei	30-mei	5-jun	12-jun	Grand Total
geen	agEU + agCH	[redacted]	25	27	38	30	0	120
			0	25	38	17	0	80
			3	15	36	26	0	80
			9	21	24	26	0	80
	geen		31	28	35	26	0	120
			1	23	30	17	9	80
			0	16	36	18	10	80
			3	20	30	15	12	80
V10	agEU + agCH		7	34	33	28	18	120
			2	21	20	16	21	80
			0	17	16	27	20	80
			0	16	19	20	25	80
	geen		15	35	31	35	4	120
			1	18	28	16	17	80
			0	20	24	23	13	80
			0	17	25	21	17	80
VC	agCH		33	27	32	28	0	120
			0	22	23	21	14	80
			0	18	19	25	18	80
			4	17	18	23	18	80
VX	agEU		8	33	44	33	2	120
			3	17	27	20	13	80
			0	18	20	24	18	80
			0	15	21	19	21	76

Productiecijfers gac voorjaar 2013 tm 13 juni

			Gegevens						
mild	agressief	ras	trossen	vruchten	gewicht (kg)	aantal vruchten wankleur licht	aantal vruchten wankleur matig	aantal vruchten lichte print	aantal vruchten matig print
geen	agEU + agCH	[redacted]	120	984	31.9	0	0	0	0
			80	376	41.5	0	5	0	19
			80	401	48.6	3	0	5	0
			80	403	44.5	0	16	24	0
	geen		120	970	33.7	0	0	0	0
			80	403	45.6	0	0	0	0
			80	405	46.1	0	0	0	0
			80	415	47.1	0	0	0	0
V10	agEU + agCH		120	994	32.8	0	0	0	0
			80	407	49.6	3	0	6	0
			80	414	56.2	16	0	13	0
			80	413	46.8	4	0	2	0
	geen		120	960	33.5	0	0	0	0
			80	389	51.7	0	10	0	16
			80	401	54.5	0	0	0	0
			80	403	49.3	0	10	0	14
VC	agCH		120	972	32.9	0	0	0	0
			80	400	47.2	4	0	4	0
			80	399	54.9	13	0	0	2
			80	406	49.4	9	0	7	0
VX	agEU		120	963	33.3	0	0	0	0
			80	405	47.2	0	4	0	0
			80	401	51.8	1	0	0	0
			76	378	45.8	2	0	0	2

aantal misvorming licht	aantal misvorming matig	Aantal aantal misvorming veel	aantal neusrot licht	aantal vruchten neusrot	aantal open vrucht iets	aantal open vrucht veel
0	0	0	1	0	0	0
18	0	0	0	1	0	0
3	0	0	1	0	0	0
0	0	0	41	69	0	0
0	0	0	0	0	0	0
1	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	3	0	0	0
0	0	0	0	0	0	0
0	0	0	7	4	0	0
0	0	0	0	0	0	0
0	0	0	2	2	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	1	0	0	0
0	0	0	4	5	0	0
0	0	0	0	0	0	0
0	0	0	2	0	0	0
0	0	0	1	0	0	0
0	0	0	26	4	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	1	0	0	0
0	0	0	3	0	0	0

Sum of trossen		ras				
mild	agressief	[redacted]	[redacted]	[redacted]	[redacted]	Grand Total
geen	agEU + agCH	120	80	80	80	360
	geen	120	80	80	80	360
V10	agEU + agCH	120	80	80	80	360
	geen	120	80	80	80	360
VC	agCH	120	80	80	80	360
VX	agEU	120	80	80	76	356

Sum of vruchten		ras				
mild	agressief	[redacted]	[redacted]	[redacted]	[redacted]	Grand Total
geen	agEU + agCH	984	376	401	403	2164
	geen	970	403	405	415	2193
V10	agEU + agCH	994	407	414	413	2228
	geen	960	389	401	403	2153
VC	agCH	972	400	399	406	2177
VX	agEU	963	405	401	378	2147

Sum of gewicht (kg)		ras				
mild	agressief	[redacted]	[redacted]	[redacted]	[redacted]	Grand Total
geen	agEU + agCH	31,9	41,5	48,6	44,5	166,5
	geen	33,7	45,6	46,1	47,1	172,5
V10	agEU + agCH	32,8	49,6	56,2	46,8	185,3
	geen	33,5	51,7	54,5	49,3	189,0
VC	agCH	32,9	47,2	54,9	49,4	184,3
VX	agEU	33,3	47,2	51,8	45,8	178,1

Productiecijfers t/m 6 juni

vruchten/tros		ras				
mild	agressief	[redacted]	[redacted]	[redacted]	[redacted]	Grand Total
geen	agEU + agCH	8,2	4,7	5,0	5,0	6,0
	geen	8,1	5,0	5,1	5,2	6,1
V10	agEU + agCH	8,3	5,1	5,2	5,2	6,2
	geen	8,0	4,9	5,0	5,0	6,0
VC	agCH	8,1	5,0	5,0	5,1	6,0
VX	agEU	8,0	5,1	5,0	5,0	6,0

gemiddeld vruchtgewicht		ras				
mild	agressief	[redacted]	[redacted]	[redacted]	[redacted]	Grand Total
geen	agEU + agCH	32,4		121,1	110,3	76,9
	geen	34,7	113,1	113,8	113,6	78,7
V10	agEU + agCH	33,0	121,7	135,7	113,5	83,2
	geen	34,9	132,9	135,9	122,2	87,8
VC	agCH	33,8	118,0	137,5	121,7	84,7
VX	agEU	34,6	116,4	129,2	121,1	82,9

productie per m2		ras				
mild	agressief	[redacted]	[redacted]	[redacted]	[redacted]	gemiddeld
geen	agEU + agCH	5,7	7,4	8,7	7,9	7,4
	geen	6,0	8,1	8,2	8,4	7,7
V10	agEU + agCH	5,9	8,8	10,0	8,4	8,3
	geen	6,0	9,2	9,7	8,8	8,4
VC	agCH	5,9	8,4	9,8	8,8	8,2
VX	agEU	5,9	8,4	9,3	8,2	7,9

geoogste trossen/plant		ras				
mild	agressief	[redacted]	[redacted]	[redacted]	[redacted]	gemiddeld
geen	agEU + agCH	6,0	4,0	4,0	4,0	4,5
	geen	6,0	4,0	4,0	4,0	4,5
V10	agEU + agCH	6,0	4,0	4,0	4,0	4,5
	geen	6,0	4,0	4,0	4,0	4,5
VC	agCH	6,0	4,0	4,0	4,0	4,5
VX	agEU	6,0	4,0	4,0	3,8	4,5

datum	29-mrt

Gemiddelde van decimaal bloei

Gemiddelde van decimaal bloei		ras				
mild	agressief	[redacted]	[redacted]	[redacted]	[redacted]	Grand Total
geen	agEU + agCH	2,6	2,3	3,7	2,2	2,7
	geen	2,5	2,4	3,1	2,2	2,6
V10	agEU + agCH	1,7	1,6	2,5	1,7	1,9
	geen	2,1	1,7	3,3	1,7	2,2
VC	agCH	1,7	1,6	3,3	1,8	2,1
VX	agEU	2,3	1,9	3,2	2,2	2,4
Grand Total		2,2	1,9	3,2	2,0	2,3

datum	29-mrt

Gemiddelde van decimaal gezet

Gemiddelde van decimaal gezet		ras				
mild	agressief	[redacted]	[redacted]	[redacted]	[redacted]	Grand Total
geen	agEU + agCH	3,4	2,9	4,6	2,9	3,4
	geen	3,4	3,2	3,9	2,8	3,3
V10	agEU + agCH	2,5	2,3	3,4	2,4	2,6
	geen	2,8	2,4	4,0	2,5	2,9
VC	agCH	2,7	2,3	4,1	2,5	2,9
VX	agEU	2,9	2,6	3,9	2,8	3,0
Grand Total		2,9	2,6	4,0	2,7	3,0

Sum of gvg

Sum of gvg		!ras				
!mild	!agressief	[redacted]	[redacted]	[redacted]	[redacted]	Grand Total
geen	agEU + agCH	95,8	203,0	234,6	208,0	741,5
	geen	101,1	134,1	129,2	106,8	471,2
V10	agEU + agCH	38,4	135,9	126,6	126,9	427,7
	geen	37,5	143,9	113,4	123,7	418,5
VC	agCH	92,6	107,9	117,0	0,0	317,5
VX	agEU	38,5	110,8	115,7	0,0	265,0

productie per m2		ras				
mild	agressief	[redacted]	[redacted]	[redacted]	[redacted]	gemiddeld
geen	agEU + agCH	1,8	3,0	2,6	1,6	8,9
	geen	1,6	2,3	2,4	1,0	7,4
V10	agEU + agCH	0,2	0,5	0,4	0,2	1,3
	geen	0,9	1,2	0,7	0,8	3,5
VC	agCH	1,1	0,7	0,3	0,0	2,1
VX	agEU	1,2	1,0	0,6	0,0	2,8

geoogste trossen per plant		ras				
mild	agressief	[redacted]	[redacted]	[redacted]	[redacted]	gemiddeld
geen	agEU + agCH	1,5	1,5	1,3	1,0	1,3
	geen	1,3	1,0	1,1	0,6	1,0
V10	agEU + agCH	0,2	0,2	0,2	0,1	0,2
	geen	0,9	0,5	0,4	0,4	0,5
VC	agCH	1,1	0,4	0,2	0,0	0,4
VX	agEU	1,1	0,5	0,3	0,0	0,5

I-13-6701-2 [redacted]

mild	agressief	ras	brandnetel gem % bladopp	brandnetel perc pl	mozaïek gem % bladopp	mozaïek perc pl	bladnecr gem % bladopp	bladnecr perc pl
geen	agEU + agCH	[redacted]	51,5	100,0	48,8	100,0	57,0	100,0
			61,0	100,0	65,5	100,0	69,0	100,0
			59,0	100,0	64,5	100,0	65,5	100,0
			60,0	100,0	61,3	100,0	67,5	100,0
	geen		0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0
V10	agEU + agCH		12,0	40,5	10,8	70,0	0,0	0,0
			10,0	31,0	10,8	65,0	0,0	0,0
			22,5	21,0	10,3	63,0	13,3	7,5
			26,3	23,0	11,6	54,0	36,1	5,0
	geen		10,8	50,5	38,5	70,5	0,0	0,0
			10,0	32,5	10,0	60,0	0,0	0,0
			10,0	20,5	10,0	60,5	0,0	0,0
			12,5	30,5	10,0	60,0	0,0	0,0
VC	agCH		10,0	20,0	11,0	51,0	0,0	0,0
			10,0	10,5	8,7	52,0	0,0	0,0
			10,0	20,0	9,5	50,5	0,0	0,0
			10,0	13,0	9,8	41,0	0,0	0,0
VX	agEU		10,0	0,5	10,8	33,5	1,0	10,0
			0,0	0,0	7,5	20,0	5,3	5,3
			0,0	0,0	8,4	30,5	1,0	2,5
			0,0	0,0	9,9	30,0	0,0	0,0

stengelnecr gem % bladopp	stengelnecr perc pl	gele stip gem % bladopp	gele stip perc pl	chlorose gem % bladopp	chlorose perc pl
22,0	100,0	0,0	0,0	0,0	0,0
28,5	100,0	0,0	0,0	0,0	0,0
26,0	100,0	0,0	0,0	0,0	0,0
25,5	100,0	0,0	0,0	0,0	0,0
0,0	0,0	0,0	0,0	0,0	0,0
0,0	0,0	0,0	0,0	0,0	0,0
0,0	0,0	0,0	0,0	0,0	0,0
0,0	0,0	0,0	0,0	0,0	0,0
0,0	0,0	0,1	26,0	0,0	0,0
0,0	0,0	0,1	23,0	0,0	0,0
0,0	0,0	0,1	17,0	10,0	25,0
10,0	2,0	0,1	23,5	0,0	0,0
0,0	0,0	0,1	50,0	0,0	0,0
0,0	0,0	0,1	34,5	0,0	0,0
0,0	0,0	0,1	31,0	10,0	100,0
0,0	0,0	0,1	40,0	0,0	0,0
0,0	0,0	0,1	41,0	0,0	0,0
0,0	0,0	0,1	34,0	0,0	0,0
0,0	0,0	0,1	27,0	0,0	0,0
0,0	0,0	0,1	33,5	0,0	0,0
0,0	0,0	0,1	5,5	0,0	0,0
0,0	0,0	0,1	2,1	0,0	0,0
0,0	0,0	0,1	3,0	10,0	33,3
0,0	0,0	0,1	5,0	0,0	0,0

mild	agressief	brandnetel gem % bladopp	brandnetel perc pl	mozaïek gem % bladopp	mozaïek perc pl	bladnecr gem % bladopp	bladnecr perc pl	stengelnecr gem % bladopp
geen	agEU + agCH	57,9	100,0	60,0	100,0	64,8	100,0	25,5
	geen	0,0	0,0	0,0	0,0	0,0	0,0	0,0
V10	agEU + agCH	18,6	28,9	10,8	63,0	29,6	5,7	10,0
	geen	10,8	33,5	18,0	62,8	0,0	0,0	0,0
VC	agCH	10,0	15,9	9,7	48,6	0,0	0,0	0,0
VX	agEU	10,0	0,1	9,4	28,5	3,6	5,2	0,0

stengelnecr perc pl	gele stip gem % bladopp	gele stip perc pl	chlorose gem % bladopp	chlorose perc pl
100,0	0,0	0,0	0,0	0,0
0,0	0,0	0,0	0,0	0,0
1,4	0,1	22,4	10,0	7,1
0,0	0,1	38,9	10,0	100,0
0,0	0,1	33,9	0,0	0,0
0,0	0,1	3,9	10,0	12,5

# trossen	!ras				
!behandeling	[redacted]			[redacted]	Grand Total
geen agEU + agCH	80	77	80	73	310
geen geen	80	77	79	62	298
V10 agEU + agCH	91	66	75	56	288
V10 geen	80	68	65	63	276
VC agCH	93	62	69	62	286
VX agEU	80	70	78	61	289
Grand Total	504	420	446	377	1747

Sum of gewicht (kg)			!weeknum						
			!weeknum						
!mild	!agressief	[redacted]	18	19	20	21	22	23	Grand Total
geen	agEU + agCH		4,71	4,77	4,09	5,31	1,92	0	20,8
			0	0	13,02	12,52	12,42	1,45	39,41
			0	0,73	13,96	12,68	17,66	3,7	48,73
			0	0,46	10,13	10,42	10,85	3,91	35,77
	geen		4,96	6,2	4,56	6,31	0	0	22,03
			0	12,39	9,82	6,56	13,8	6,3	48,87
			0	13,6	8,98	8,26	16,24	8,32	55,4
V10	agEU + agCH		0	5,85	8,19	8,38	9,97	4,22	36,61
			2,57	6,34	6,16	8,68	4,93	0	28,68
			0	0	11,71	12,77	12,29	4,82	41,59
			0	1,63	14,58	12,86	16,92	8,88	54,87
	geen		0	0	11,82	9,11	9,61	2,94	33,48
			1,08	6,37	4,9	8	3,05	0	23,4
			0	2,13	9,55	13,83	11,18	6,7	43,39
			0	2,27	10,77	11,67	14,38	6,58	45,67
VC	agCH		0	1,45	6,42	10,57	9,85	8,29	36,58
			1,65	6,39	6,88	5,76	9,38	0	30,06
			0	0	13,5	10,46	10,81	5,28	40,05
			0	0	16,29	12,9	12,59	8,6	50,38
VX	agEU		0	0	11,52	3,69	8,91	11,64	35,76
			6,04	5,12	3,46	8,04	2,12	0	24,78
			0	7,41	6,82	9,29	11,75	7,48	42,75
			1,37	11,08	9,31	6,4	15,34	11,42	54,92
			0	1,76	9,9	5,83	11,35	5,66	34,5

Sum of trossen			!weeknum						
!mild	!agressief	!ras	18	19	20	21	22	23	Grand Total
geen	agEU + agCH	[redacted]	19	16	16	23	6	0	80
			0	0	20	27	28	2	77
			0	1	20	20	32	7	80
			0	1	16	21	23	12	73
	geen		19	22	17	22	0	0	80
			0	20	15	10	22	10	77
			0	20	12	11	23	13	79
			0	9	13	14	18	8	62
V10	agEU + agCH		9	21	19	26	16	0	91
			0	0	19	20	19	8	66
			0	2	20	17	24	12	75
			0	0	19	15	17	5	56
	geen		4	23	17	26	10	0	80
			0	3	15	21	19	10	68
			0	3	15	16	21	10	65
			0	2	11	18	17	15	63
VC	agCH		6	22	20	17	28	0	93
			0	0	21	17	16	8	62
			0	0	22	17	18	12	69
			0	0	20	6	16	20	62
VX	agEU		22	17	11	24	6	0	80
			0	12	11	15	21	11	70
			2	16	13	8	22	17	78
			0	3	17	10	21	10	61

			Data						
!mild	!agressief	!ras	vruchtentot	marmering	wankleur	beschadiging	misvorming	neusrot	open vrucht
geen	agEU + agCH	[redacted]	600	0	40	82	34	0	
			359	14	89	130	55	0	
			389	18	76	103	80	0	
			353	4	52	142	54	0	
	geen		632	0	0	4	0	0	
			387	0	1	19	0	0	
			397	0	9	12	1	1	
			306	0	0	22	4	1	
V10	agEU + agCH		728	0	2	9	0	0	
			330	0	9	48	7	1	
			375	0	4	30	1	1	
			279	0	16	31	1	0	
	geen		640	0	0	8	0	0	
			342	0	12	23	0	0	
			328	0	7	17	3	0	
			313	0	12	20	1	1	
VC	agCH		744	0	1	13	0	0	
			310	0	9	36	2	1	
			345	0	11	24	1	0	
			310	5	21	26	5	0	
VX	agEU		639	0	2	6	0	0	
			351	0	9	25	6	0	
			392	0	2	18	0	0	
			305	0	3	21	0	0	

Som van trossen		!ras				
!mild	!agressief	[redacted]				Grand Total
geen	agEU + agCH	80	77	80	73	310
	geen	80	77	79	62	298
V10	agEU + agCH	91	66	75	56	288
	geen	80	68	65	63	276
VC	agCH	93	62	69	62	286
VX	agEU	80	70	78	61	289

Som van vruchten		!ras				
!mild	!agressief	[redacted]				Grand Total
geen	agEU + agCH	600	359	389	353	1701
	geen	632	387	397	306	1722
V10	agEU + agCH	728	330	375	279	1712
	geen	640	342	328	313	1623
VC	agCH	744	310	345	310	1709
VX	agEU	639	351	392	305	1687

Som van gewicht (kg)		!ras				
!mild	!agressief	[redacted]				Grand Total
geen	agEU + agCH	20,8	39,41	48,73	35,77	144,71
	geen	22,03	48,87	55,4	36,61	162,91
V10	agEU + agCH	28,68	41,59	54,87	33,48	158,62
	geen	23,4	43,39	45,67	36,58	149,04
VC	agCH	30,06	40,05	50,38	35,76	156,25
VX	agEU	24,78	42,75	54,92	34,5	156,95

vruchten/tros		!ras				
!mild	!agressief	[redacted]				Grand Total
geen	agEU + agCH	7,5	4,7	4,9	4,8	5,5
	geen	7,9	5	5	4,9	5,8
V10	agEU + agCH	8	5	5	5	5,9
	geen	8	5	5	5	5,9
VC	agCH	8	5	5	5	6
VX	agEU	8	5	5	5	5,8

gemiddeld vruchtgewicht		!ras				
!mild	!agressief	[redacted]				Grand Total
geen	agEU + agCH	34,7	109,8	125,3	101,3	85,1
	geen	34,9	126,3	139,5	119,6	94,6
V10	agEU + agCH	39,4	126	146,3	120	92,7
	geen	36,6	126,9	139,2	116,9	91,8
VC	agCH	40,4	129,2	146	115,4	91,4
VX	agEU	38,8	121,8	140,1	113,1	93

productie per m2		!ras				
!mild	!agressief	[redacted]				Grand Total
geen	agEU + agCH	2,9	5,5	6,8	5	20,3
	geen	3,1	6,8	7,8	5,1	22,8
V10	agEU + agCH	4	5,8	7,7	4,7	22,2
	geen	3,3	6,1	6,4	5,1	20,9
VC	agCH	4,2	5,6	7,1	5	21,9
VX	agEU	3,5	6	7,7	4,8	22

geoogste trossen/plant		!ras				
!mild	!agressief	[redacted]		[redacted]		Grand Total
geen	agEU + agCH	4	3,9	4	3,7	3,9
	geen	4	3,9	4	3,1	3,8
V10	agEU + agCH	4,6	3,3	3,8	2,8	3,6
	geen	4	3,4	3,3	3,2	3,5
VC	agCH	4,7	3,1	3,5	3,1	3,6
VX	agEU	4	3,5	3,9	3,1	3,6

Gemiddelde decimale bloei in week 14

		!ras				
!mild	!agressief	[redacted]		[redacted]		Grand Total
geen	agEU + agCH	5,3	4,0	4,2	4,0	4,4
	geen	5,3	4,5	4,6	3,2	4,4
V10	agEU + agCH	4,6	4,0	3,9	3,8	4,1
	geen	4,8	4,1	3,3	3,9	4,0
VC	agCH	5,0	4,2	4,2	3,6	4,2
VX	agEU	5,2	3,8	4,4	3,9	4,3
Grand Total		5,0	4,1	4,1	3,7	4,2

Gemiddelde decimale bloei in week 17

		!ras				
!mild	!agressief	[redacted]		[redacted]		Grand Total
geen	agEU + agCH	8,6	2,1	7,2	6,4	6,1
	geen	8,4	7,1	7,1	6,2	7,2
V10	agEU + agCH	8,4	5,7	6,9	6,6	6,9
	geen	7,9	6,6	6,5	6,1	6,8
VC	agCH	8,3	7,0	5,8	6,2	6,8
VX	agEU	8,2	5,7	6,8	6,1	6,7
Grand Total		8,3	5,7	6,7	6,2	6,7

Toename decimale bloei van week 14 tot week 17

		!ras				
!mild	!agressief	[redacted]		[redacted]		Grand Total
geen	agEU + agCH	3,4	0,0	3,0	2,4	2,2
	geen	3,2	2,6	2,4	3,0	2,8
V10	agEU + agCH	3,7	1,8	3,0	2,8	2,8
	geen	3,2	2,5	3,2	2,2	2,8
VC	agCH	3,3	2,8	1,6	2,5	2,6
VX	agEU	3,0	1,9	2,5	2,2	2,4
Grand Total		3,3	1,9	2,6	2,5	2,6

Gemiddelde van decimaal gezet in week 14

		!ras				
!mild	!agressief	[redacted]	[redacted]	[redacted]	[redacted]	Grand Total
geen	agEU + agCH	4,2	3,4	3,4	3,5	3,6
	geen	4,6	4,0	4,0	3,4	4,0
V10	agEU + agCH	3,8	3,0	3,1	3,2	3,3
	geen	4,3	3,8	3,6	3,4	3,8
VC	agCH	4,0	3,2	3,2	2,8	3,3
VX	agEU	4,5	4,0	3,9	3,5	4,0
Grand Total		4,2	3,6	3,5	3,3	3,6

Gemiddelde van decimaal gezet in week 17

		!ras				
!mild	!agressief	[redacted]	[redacted]	[redacted]	[redacted]	Grand Total
geen	agEU + agCH	8,2	6,2	6,5	5,8	6,7
	geen	7,5	6,4	6,2	5,5	6,4
V10	agEU + agCH	7,7	6,2	6,3	6,0	6,6
	geen	7,1	6,1	5,9	5,6	6,2
VC	agCH	7,7	6,5	6,4	5,7	6,6
VX	agEU	7,4	5,3	6,0	5,5	6,1
Grand Total		7,6	6,1	6,2	5,7	6,4

Toename decimale zetting van week 14 tot week 17

		!ras				
!mild	!agressief	[redacted]	[redacted]	[redacted]	[redacted]	Grand Total
geen	agEU + agCH	4,0	2,8	3,1	2,3	3,1
	geen	2,9	2,4	2,2	2,2	2,4
V10	agEU + agCH	3,9	3,3	3,2	2,8	3,3
	geen	2,9	2,3	2,3	2,2	2,4
VC	agCH	3,7	3,3	3,2	3,0	3,3
VX	agEU	2,9	1,3	2,2	2,0	2,1
Grand Total		3,4	2,6	2,7	2,4	2,8

		!ras				
!mild	!agressief	[redacted]	[redacted]	[redacted]	[redacted]	Grand Total
geen	agEU + agCH	1,1	0,6	0,8	0,6	0,8
	geen	0,7	0,5	0,6	0,0	0,5
V10	agEU + agCH	0,8	1,0	0,8	0,6	0,8
	geen	0,5	0,3	0,0	0,5	0,3
VC	agCH	1,0	1,0	1,0	0,9	1,0
VX	agEU	0,6	0,0	0,5	0,4	0,4
Grand Total		0,8	0,6	0,6	0,5	0,6

		!ras				
!mild	!agressief	[redacted]	[redacted]	[redacted]	[redacted]	Grand Total
geen	agEU + agCH	0,4	0,0	0,6	0,6	0,4
	geen	0,9	0,7	0,9	0,6	0,8
V10	agEU + agCH	0,6	0,0	0,6	0,6	0,5
	geen	0,8	0,5	0,6	0,6	0,6
VC	agCH	0,6	0,5	0,0	0,4	0,4
VX	agEU	0,8	0,4	0,8	0,6	0,7
Grand Total		0,7	0,4	0,6	0,6	0,5

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mild	agressief	ras	brandnetel %bladopv	brandnetel % planten	mozaiek %bladopv	mozaiek % planten	gele stippen %bladopv	gele stippen % planten	bladnecrose %bladopv
geen	agEU + agCH	[redacted]	17,5	66,7	0,0	0,0	0,0	0,0	6,0
			34,2	66,7	0,0	0,0	0,0	0,0	23,7
			27,5	66,7	0,0	0,0	0,0	0,0	12,0
			36,7	66,7	0,0	0,0	0,0	0,0	22,5
	geen		0,8	16,7	0,0	0,0	0,0	0,0	0,0
			2,5	33,3	0,0	0,0	0,0	0,0	0,0
			1,7	16,7	0,0	0,0	0,0	0,0	0,0
			1,7	16,7	0,0	0,0	0,0	0,0	0,0
V10	agEU + agCH		4,2	16,7	0,0	0,0	0,0	0,0	0,0
			10,8	35,0	0,0	0,0	0,0	0,0	0,8
			9,2	41,7	0,0	0,0	0,0	0,0	0,8
			10,8	35,8	0,0	0,0	0,0	0,0	4,2
	geen		1,7	16,7	0,0	0,0	0,0	1,7	0,0
			5,0	33,3	0,0	0,0	0,0	0,0	0,0
			4,2	33,3	0,0	0,0	0,0	0,0	0,0
			3,3	33,3	0,0	0,0	0,0	0,0	0,0
VC	agCH		3,3	16,7	0,0	0,0	0,0	1,7	0,0
			5,0	16,7	0,0	0,0	0,0	0,0	0,0
			5,8	16,7	0,0	0,0	0,0	3,3	0,0
			4,2	16,7	0,0	0,0	0,0	8,3	0,0
VX	agEU		3,3	16,7	0,0	0,0	0,0	0,0	0,0
			3,3	16,7	0,0	0,0	0,0	0,0	0,0
			5,0	16,7	0,0	0,0	0,0	0,0	0,0
			4,2	33,3	0,0	0,0	0,0	1,7	0,2

bladnecrose % planten	stengel necrose %bladopvl	stengel necrose % planten	chlorose %bladopvl	chlorose % planten	gewas stand (10-1)	gewas bescha diging (10-1)	groei remming (%)
67,8	17,5	50,0	0,0	0,0	6,3	0,0	0,0
73,3	19,5	50,0	0,0	0,0	4,3	0,0	0,0
70,0	19,3	50,0	0,0	0,0	5,3	0,0	0,0
71,7	20,3	50,0	0,0	0,0	4,3	0,0	0,0
0,0	0,0	0,0	0,0	0,0	7,7	0,0	0,0
0,0	0,0	0,0	0,0	0,0	7,8	0,0	0,0
0,0	0,0	0,0	0,0	0,0	7,8	0,0	0,0
0,0	0,0	0,0	0,0	0,0	7,7	0,0	0,0
0,0	0,0	0,0	0,0	0,0	7,5	0,0	0,0
1,7	0,0	0,0	0,0	0,0	7,5	0,0	0,0
4,2	0,0	0,0	0,0	0,0	7,3	0,0	0,0
2,5	0,0	0,0	0,0	0,0	8,0	0,0	0,0
0,0	0,0	0,0	0,0	0,0	7,7	0,0	0,0
0,0	0,0	0,0	0,0	0,0	7,7	0,0	0,0
0,0	0,0	0,0	0,0	0,0	7,7	0,0	0,0
0,0	0,0	0,0	0,0	0,0	7,8	0,0	0,0
0,0	0,0	0,0	0,0	0,0	7,8	0,0	0,0
0,0	0,0	0,0	0,0	0,0	7,8	0,0	0,0
0,0	0,0	0,0	0,0	0,0	7,5	0,0	0,0
0,0	0,0	0,0	0,0	0,0	8,0	0,0	0,0
14,7	0,0	0,0	0,0	0,0	7,3	0,0	0,0
16,2	0,0	0,0	0,0	0,0	7,5	0,0	0,0
16,7	0,0	0,0	0,0	0,0	7,5	0,0	0,0
14,7	0,0	0,0	0,0	0,0	7,3	0,0	0,0

mild	agressief	brandnetel %bladopvl	brandnetel % planten	mozaiek %bladopvl	mozaiek % planten	gele stippen %bladopvl	gele stippen % planten	bladnecrose %bladopvl	bladnecrose % planten
geen	agEU + agCH	29,0	66,7	0,0	0,0	0,0	0,0	16,0	70,7
	geen	1,7	20,8	0,0	0,0	0,0	0,0	0,0	0,0
V10	agEU + agCH	8,8	32,3	0,0	0,0	0,0	0,0	1,5	2,1
	geen	3,5	29,2	0,0	0,0	0,0	0,4	0,0	0,0
VC	agCH	4,6	16,7	0,0	0,0	0,0	3,3	0,0	0,0
VX	agEU	4,0	20,8	0,0	0,0	0,0	0,4	0,1	15,5

stengel necrose %bladopvl	stengel necrose % planten	chlorose %bladopvl	chlorose % planten	gewas stand (10-1)	gewas bescha diging (10-1)	groei remming (%)
19,2	50,0	0,0	0,0	5,1	0,0	0,0
0,0	0,0	0,0	0,0	7,8	0,0	0,0
0,0	0,0	0,0	0,0	7,6	0,0	0,0
0,0	0,0	0,0	0,0	7,7	0,0	0,0
0,0	0,0	0,0	0,0	7,8	0,0	0,0
0,0	0,0	0,0	0,0	7,4	0,0	0,0

Sum of vruchten			datum				
mild	agressief	ras	13-mei	21-mei	27-mei	6-jun	Grand Total
geen	agEU + agCH	[redacted]	568	291	278	384	1521
			213	132	118	245	708
			186	143	103	258	690
			218	98	63	190	569
	geen		372	371	212	354	1309
			117	129	98	170	514
			101	157	73	214	545
			78	118	56	168	420
V10	agEU + agCH		520	374	261	545	1700
			112	121	85	217	535
			134	119	77	273	603
			116	110	74	187	487
	geen		338	340	283	496	1457
			119	115	129	212	575
			116	126	107	236	585
			94	107	92	164	457
VC	agCH		565	294	285	360	1504
			149	131	126	201	607
			152	135	115	253	655
			119	87	116	164	486
VX	agEU		587	256	292	371	1506
			89	107	67	142	405
			182	131	112	207	632
			177	111	95	130	513

Sum of trossen		ras				
mild	agressief	[redacted]	[redacted]	[redacted]	[redacted]	Grand Total
geen	agEU + agCH	183	141	136	116	576
	geen	166	101	109	83	459
V10	agEU + agCH	184	106	119	99	508
	geen	180	114	115	91	500
VC	agCH	185	119	130	97	531
VX	agEU	187	80	125	102	494
Grand Total		1085	661	734	588	3068

Sum of gewicht (kg)			datum				
mild	agressief	ras	13-mei	21-mei	27-mei	6-jun	Grand Total
geen	agEU + agCH	[redacted]	24,83	14,36	13,77	22,13	75,09
			30,1	20,48	16,85	47,73	115,16
			28,96	22,89	19,61	53,78	125,24
			25,09	11,9	8,77	28,09	73,85
	geen		14,73	17,59	9,18	21,6	63,1
			14,87	19,24	13,36	31,84	79,31
			13,91	24,95	11,31	40,47	90,64
			8,06	15,19	9,02	22,89	55,16
V10	agEU + agCH		24,08	17,84	12,74	21,15	75,81
			17,64	18,91	15,25	44,15	95,95
			24,04	21,02	14	55,61	114,67
			15,5	13,65	11,06	33,09	73,3
	geen		15,58	18,35	14,26	21,97	70,16
			17,23	18	14,85	39,23	89,31
			18,85	21,58	22,26	50,1	112,79
			11	14,19	14,47	28,25	67,91
VC	agCH		27,66	15,14	14	21,85	78,65
			22,44	21,07	17,02	44,69	105,22
			25,33	25,32	19,61	53,27	123,53
			14,31	11,08	15,71	29,7	70,8
VX	agEU		27,81	11,47	13,17	20,1	72,55
			14,02	17,31	10,92	30,14	72,39
			30,35	23,54	21,79	48,15	123,83
			22,55	13,41	14,37	26,6	76,93

Sum of trossen			datum				
mild	agressief	ras	13-mei	21-mei	27-mei	6-jun	Grand Total
geen	agEU + agCH	[redacted]	68	36	34	45	183
			42	27	23	49	141
			36	29	20	51	136
			44	21	13	38	116
	geen		45	46	26	49	166
			23	25	19	34	101
			22	31	14	42	109
			15	23	11	34	83
V10	agEU + agCH		58	46	32	48	184
			22	24	17	43	106
			26	24	15	54	119
			24	22	15	38	99
	geen		41	42	35	62	180
			24	23	25	42	114
			23	25	21	46	115
			19	21	18	33	91
VC	agCH		69	36	35	45	185
			29	26	24	40	119
			30	27	23	50	130
			24	17	23	33	97
VX	agEU		71	31	36	49	187
			18	21	13	28	80
			36	26	22	41	125
			35	22	19	26	102

Fruitsymptoms

			Data					
mild	agressief	ras	Sum of aantal marmering licht	Sum of aantal marmering matig	Sum of vruchten	Sum of aantal wankleur licht	Sum of aantal wankleur matig	Sum of aantal wankleur veel
geen	agEU + agCH	[redacted]	0	0	1521	213	0	0
			32	0	708	36	3	0
			9	0	690	40	3	0
			37	0	569	2	0	0
	geen		4	0	1309	11	0	0
			17	0	514	22	1	0
			0	0	545	54	0	0
			3	0	420	12	0	0
V10	agEU + agCH		0	0	1700	68	0	0
			2	0	535	3	0	0
			0	0	603	2	0	0
			0	0	487	26	0	0
	geen		0	0	1457	23	0	0
			0	0	575	0	0	0
			0	0	585	4	0	0
			0	0	457	0	0	0
VC	agCH		0	0	1504	34	0	0
			0	0	607	12	0	0
			0	0	655	8	0	0
			0	0	486	0	0	0
VX	agEU		18	0	1506	64	0	0
			19	0	405	3	0	0
			5	0	632	5	0	0
			10	3	513	6	0	0

Sum of aantal misvorming licht	Sum of aantal misvorming matig	Sum of aantal misvorming veel	Sum of aantal neusrot licht	Sum of aantal neusrot sterk	Sum of aantal open vrucht iets	Sum of aantal open vrucht veel
0	0	0	0	8	0	0
0	0	0	29	68	0	0
0	0	0	16	35	0	0
0	0	0	36	245	0	0
0	0	0	16	4	0	0
0	0	0	0	31	0	0
0	0	0	6	4	0	0
0	0	0	0	18	0	0
0	0	0	0	0	0	0
0	0	0	5	8	0	0
0	0	0	0	11	0	0
0	0	0	26	66	0	0
0	0	0	0	1	0	0
0	0	0	4	7	0	0
0	0	0	1	9	0	0
0	0	0	23	42	0	0
0	0	0	0	1	0	0
0	0	0	2	15	0	0
0	0	0	0	5	0	0
0	0	0	37	113	0	0
0	0	0	1	2	0	0
0	0	0	2	5	0	0
0	0	0	3	7	0	0
0	0	0	46	182	0	0

Sum of trossen		ras				
mild	agressief	[redacted]	[redacted]	[redacted]	[redacted]	Grand Total
geen	agEU + agCH	183	141	136	116	576
	geen	166	101	109	83	459
V10	agEU + agCH	184	106	119	99	508
	geen	180	114	115	91	500
VC	agCH	185	119	130	97	531
VX	agEU	187	80	125	102	494

Sum of vruchten		ras				
mild	agressief	[redacted]	[redacted]	[redacted]	[redacted]	Grand Total
geen	agEU + agCH	1521	708	690	569	3488
	geen	1309	514	545	420	2788
V10	agEU + agCH	1700	535	603	487	3325
	geen	1457	575	585	457	3074
VC	agCH	1504	607	655	486	3252
VX	agEU	1506	405	632	513	3056

Sum of gewicht (kg)		ras				
mild	agressief	[redacted]	[redacted]	[redacted]	[redacted]	Grand Total
geen	agEU + agCH	75,09	115,16	125,24	73,85	389,34
	geen	63,1	79,31	90,64	55,16	288,21
V10	agEU + agCH	75,81	95,95	114,67	73,3	359,73
	geen	70,16	89,31	112,79	67,91	340,17
VC	agCH	78,65	105,22	123,53	70,8	378,2
VX	agEU	72,55	72,39	123,83	76,93	345,7

Productiecijfers t/m 6 juni

vruchten/tros		ras				
mild	agressief	[redacted]	[redacted]	[redacted]	[redacted]	Grand Total
geen	agEU + agCH	8,3		5,1	4,9	6,1
	geen	7,9	5,1	5,0	5,1	6,1
V10	agEU + agCH	9,2	5,0	5,1	4,9	6,5
	geen	8,1	5,0	5,1	5,0	6,1
VC	agCH	8,1	5,1	5,0	5,0	6,1
VX	agEU	8,1	5,1	5,1	5,0	6,2

gemiddeld vruchtgewicht		ras				
mild	agressief	[redacted]	[redacted]	[redacted]	[redacted]	Grand Total
geen	agEU + agCH	49,4		181,5	129,8	111,6
	geen	48,2	154,3	166,3	131,3	103,4
V10	agEU + agCH	44,6	179,3	190,2	150,5	108,2
	geen	48,2	155,3	192,8	148,6	110,7
VC	agCH	52,3	173,3	188,6	145,7	116,3
VX	agEU	48,2	178,7	195,9	150,0	113,1

productie per m2		ras				
mild	agressief	[redacted]	[redacted]	[redacted]	[redacted]	gemiddeld
geen	agEU + agCH	13,4	20,6	22,4	13,2	17,4
	geen	11,3	14,2	16,2	9,8	12,9
V10	agEU + agCH	13,5	17,1	20,5	13,1	16,1
	geen	12,5	15,9	20,1	12,1	15,2
VC	agCH	14,0	18,8	22,1	12,6	16,9
VX	agEU	13,0	12,9	22,1	13,7	15,4

geoogste trossen/plant		ras				
mild	agressief	[redacted]	[redacted]	[redacted]	[redacted]	gemiddeld
geen	agEU + agCH	9,2	7,1	6,8	5,8	7,2
	geen	8,3	5,1	5,5	4,2	5,7
V10	agEU + agCH	9,2	5,3	6,0	5,0	6,4
	geen	9,0	5,7	5,8	4,6	6,3
VC	agCH	9,3	6,0	6,5	4,9	6,6
VX	agEU	9,4	4,0	6,3	5,1	6,2

Gemiddelde van decimaal gezet op 19 april

Gemiddelde van decimaal gezet		ras				
mild	agressief	[redacted]	[redacted]	[redacted]	[redacted]	Grand Total
geen	agEU + agCH	8,8	6,9	6,8	6,5	7,3
	geen	8,1	6,4	6,9	6,4	7,0
V10	agEU + agCH	7,9	6,7	6,2	6,2	6,8
	geen	7,7	6,5	6,3	6,2	6,7
VC	agCH	8,3	6,7	6,8	5,9	6,9
VX	agEU	8,4	6,8	6,9	6,2	7,0
Grand Total		8,2	6,7	6,7	6,2	6,9

Gemiddelde van decimaal bloei op 19 april

Gemiddelde van decimaal bloei		ras				
mild	agressief	[redacted]	[redacted]	[redacted]	[redacted]	Grand Total
geen	agEU + agCH	8,0	6,3	6,3	5,8	6,6
	geen	7,4	6,0	6,3	5,8	6,4
V10	agEU + agCH	7,3	6,0	5,7	5,6	6,1
	geen	7,0	5,9	5,5	5,6	6,0
VC	agCH	7,4	5,9	6,2	5,4	6,2
VX	agEU	7,7	6,1	6,3	5,7	6,4
Grand Total		7,4	6,0	6,0	5,6	6,3