UPOV
International Union for the Protection of New Varieties of Plants

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Technical Working Party for Vegetables

TWV/55/12 Add.

Fifty-Fifth Session
Antalya, Turkey, May 3 to 7, 2021

Original: English
Date: April 8, 2021

ADDENDUM TO

PARTIAL REVISION OF THE TEST GUIDELINES FOR VEGETABLE MARROW, SQUASH

Document prepared by an expert from France

Disclaimer: this document does not represent UPOV policies or guidance

The annex to this document contains a copy of a presentation on “Squash - ZYMV and WMV biotests results: 2018, 2019, 2020 DUS campaigns” by an expert from France, to be made at the fifty-fifth session of the Technical Working Party for Vegetables (TWV).

[Annex follows]

ANNEX

Squash / ZYMV and WMV biotests results

2018, 2019, 2020 DUS campaigns

TWV/55 -
May 3 – 7, 2021

GEVES
Expertise & Performance

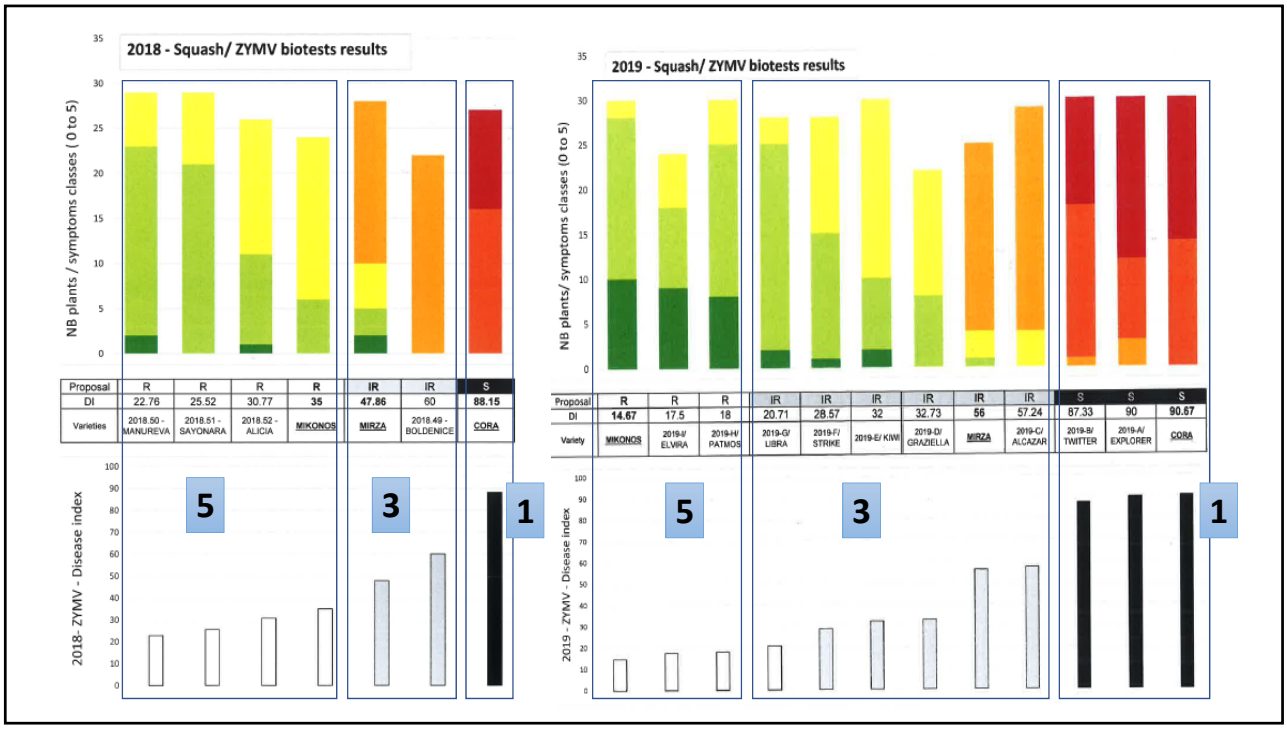
Zucchini yellow mosaic virus

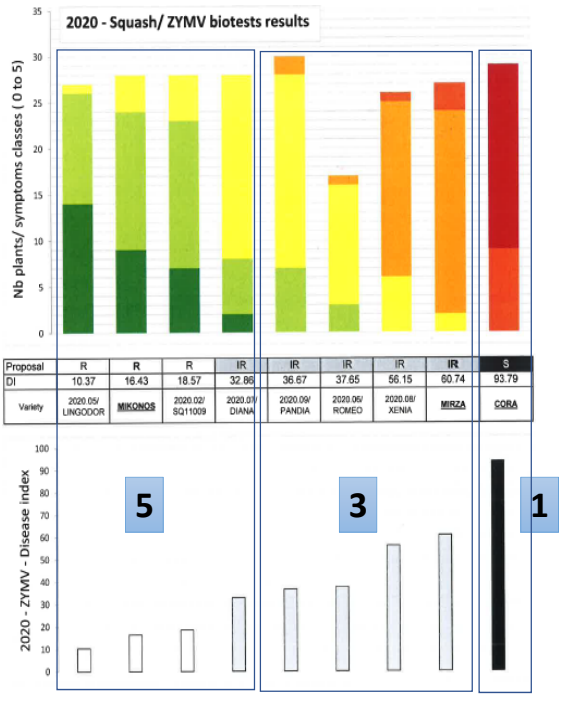
disease resistance test

6 symptom classes: 0 to 5

Proposed **UPOV note**

0: no symptom
1: Few chlorotic patches
2: Numerous chlorotic patches
3: Large chlorotic areas (some patches on young leaves)
4: Mosaic and weak vein banding
5: Deformation and vein banding





3 notes UPOV , ZYMV

- QN resistance
- Methodological reseach projects
- Harmonized disease resistance test protocol
- **3** « robust » levels
  - Susceptible: **Note 1, CORA**
  - Intermediate resistant **: Note 3, MIRZA** (lower thresold)
  - Resistant: **Note 5, MIKONOS**, (lower thesold)
- Notes 2 and 4: *not used*
  - A variety with a lower resistance than Mirza (note 3,) will be described **note 1**. A variety with a lower resistance than Mikonos (note 5), will be described **note 3**.
- Additional statistical analysis to finalize the pathologist's raw observations
  - E.g. https://pathostat.geves.fr

Zucchini - ZYMV

03 July 2020

Variety	Repetition	Class 0	Class 1	Class 2	Class 3	Class 4	Class 5
1192586	1	0	0	1	8	0	0
	2	0	0	1	7	1	0
	3	0	0	0	8	1	0
1217442	1	4	4	1	0	0	0
	2	1	5	3	0	0	0
	3	2	7	1	0	0	0
1217444	1	6	3	0	0	0	0
	2	6	2	0	0	0	0
	3	2	7	1	0	0	0
1217448	1	0	0	3	0	0	0
	2	0	1	5	0	0	0
	3	0	2	5	1	0	0
1217451	1	1	4	5	0	0	0
	2	1	1	7	0	0	0
	3	0	1	8	0	0	0
1217454	1	0	0	4	5	0	0
	2	0	0	2	7	0	0
	3	0	0	0	7	1	0
1217457	1	0	4	6	0	0	0
	2	0	2	7	1	0	0
	3	0	1	8	1	0	0
CORA (Susceptible)	1	0	0	0	0	3	6
	2	0	0	0	0	3	7
	3	0	0	0	0	3	7
MIRZA (Intermediate)	1	0	0	0	8	1	0
	2	0	0	2	7	1	0
	3	0	0	0	7	1	0
MIKONOS (High Intermediate)	1	4	6	0	0	0	0
	2	0	5	4	0	0	0
	3	5	4	0	0	0	0

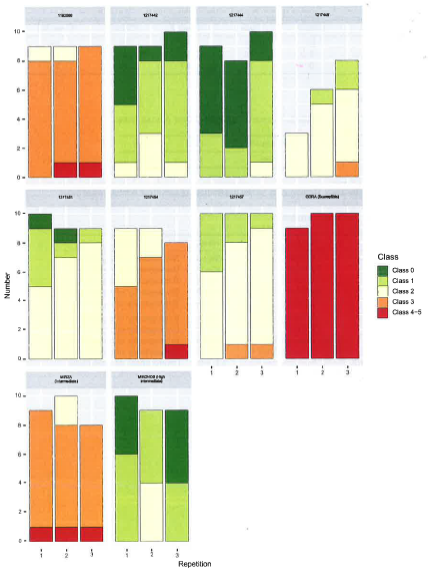
PATHOSTAT report, 3 chapters:

1. Resistance tests features
2. Comparison of distribution between repetitions
3. Study of susceptibility / resistance of varieties

Resistance test features

Parameter	Value
Species	Zucchini
Pathogen	ZYMV
Use of threshold	Don't apply any threshold
Number	20
Susceptible control	CORA
Intermediate control	MIRZA
High intermediate control	MIKONOS
Resistant control	
CTPS decision rule	IR control lower bound

Comparison of distribution between repetitions



Homogeneity regardless of the variety

- **Distribution of symptom per repetition:**

Repetition	Class 0	Class 1	Class 2	Class 3	Class 4-5
1	15	21	20	21	10
2	8	16	31	22	12
3	9	22	23	24	13

- **Chi-squared test:**

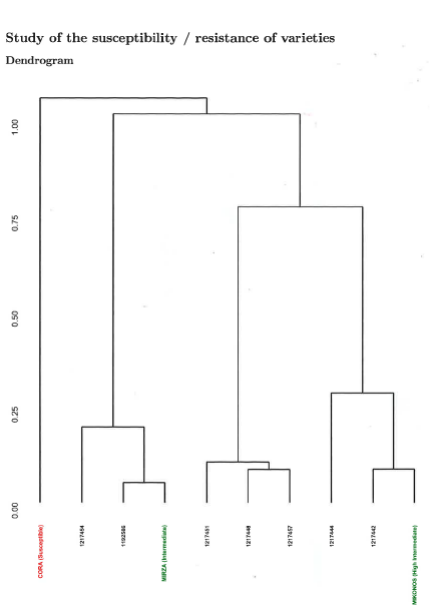
Table 3: Pearson's Chi-squared test: `pooled data`

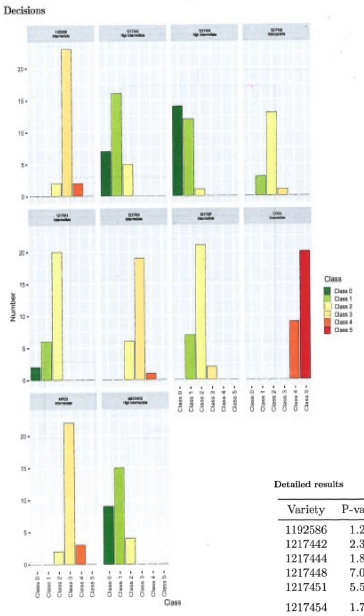
Test statistic	df	P value
6.929	8	0.5443

- **Results of the test:** Homogeneity of the distribution of symptom between repetitions

Homogeneity for each variety

Variety	P-value	Result
1192586	1.00e+00	Homogeneity of repetitions
1217442	4.85e-01	Homogeneity of repetitions
1217444	8.89e-02	Homogeneity of repetitions
1217448	1.00e+00	Homogeneity of repetitions
1217451	3.59e-01	Homogeneity of repetitions
1217454	1.43e-01	Homogeneity of repetitions
1217457	6.04e-01	Homogeneity of repetitions
CORA (Susceptible)	1.00e+00	Homogeneity of repetitions
MIRZA (Intermediate)	8.30e-01	Homogeneity of repetitions
MIKONOS (High Intermediate)	1.15e-02	Heterogeneity of repetitions





Detailed results

Variety	P-value (S)	P-value (IR)	P-value (HIR)	Proposal
1192586	1.21e-11	6.31e-01	1.55e-11	Intermediate
1217442	2.37e-13	1.00e+00	2.71e-01	High Intermediate
1217444	1.89e-13	1.00e+00	9.62e-01	High Intermediate
1217448	7.08e-11	1.00e+00	5.62e-06	Intermediate
1217451	5.57e-13	1.00e+00	2.38e-05	Intermediate
1217454	1.71e-11	9.62e-01	1.11e-10	Intermediate
1217457	1.94e-13	1.00e+00	3.71e-07	Intermediate

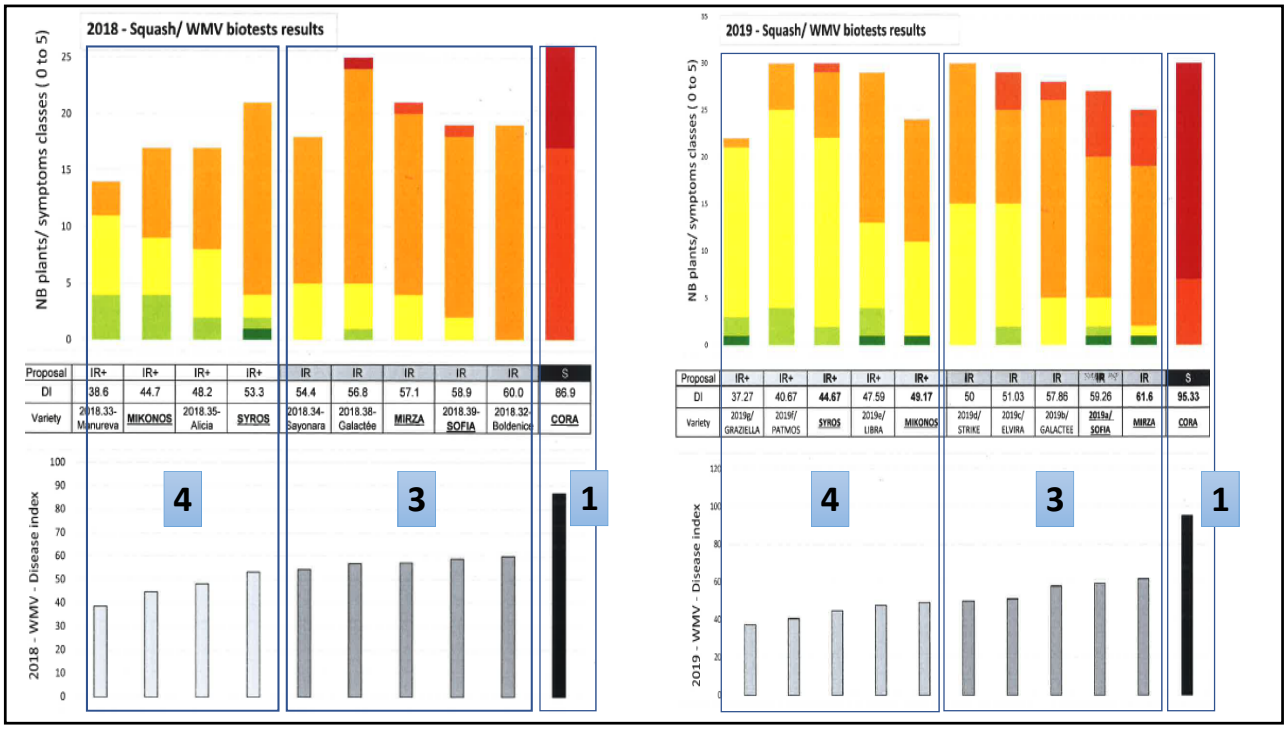
Watermelon mosaic virus

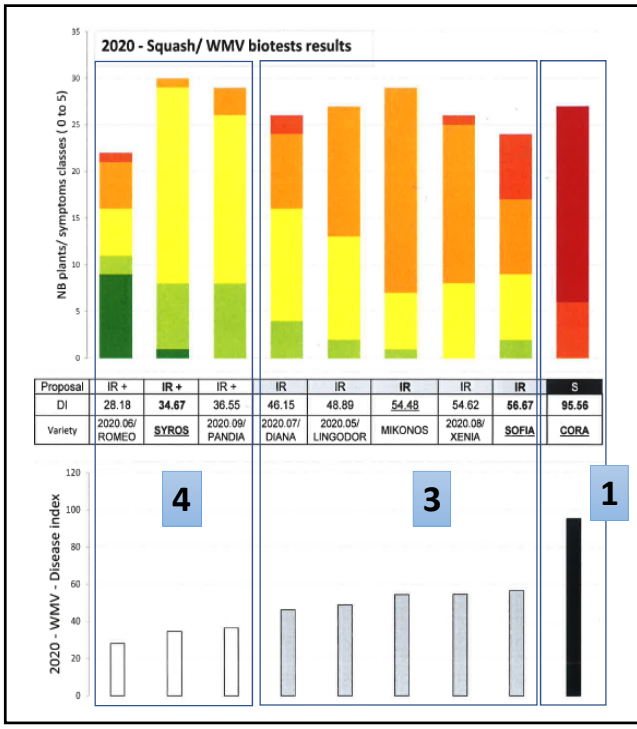
disease resistance test

6 symptom classes: 0 to 5

Proposed **UPOV note**

0: no symptom
1: Few chlorotic patches
2: Numerous chlorotic patches
3: Large chlorotic areas (some patches on young leaves)
4: Mosaic and weak vein banding
5: Deformation and vein banding





3 notes UPOV , WMV

- QN resistance
- Methodological reseach projets
- Harmonized disease resistance test protocol
- 2 « robust » levels
  - Susceptible: **Note 1, CORA**
  - Intermediate resistant **: Note 3, SOFIA** (lower thresold intermediate resistance, **Note 4**, **MIKONOS, SYROS** (higher intermediate resistance)
- Note 2 : *not used*
  - A variety with a lower of resistance than Sofia (note 3,) will be described **note 1**.
- Note 5: *not identified* ***yet***
- Additional statistical analysis to finalize the pathologist's raw observations
  - E.g. https://pathostat.geves.fr

Zucchini - WMV vf

22 January 2021

Variety	Repetition	Class 0	Class 1	Class 2	Class 3	Class 4	Class 5
CORA (Susceptible)	1	0	0	0	0	2	7
	2	0	0	0	0	3	6
	3	0	0	0	0	1	8
SOFIA (Low Intermediate)	1	0	0	3	3	3	0
	2	0	2	2	2	0	0
	3	0	0	2	3	4	0
SYROS (High Intermediate)	1	1	1	8	0	0	0
	2	0	3	7	0	0	0
	3	0	3	6	1	0	0
2020.05	1	0	0	4	5	0	0
	2	0	0	4	4	0	0
	3	0	2	3	5	0	0
2020.06	1	3	2	1	1	1	0
	2	4	0	1	3	0	0
	3	2	0	3	1	0	0
2020.07	1	0	0	5	2	1	0
	2	0	1	4	4	1	0
	3	0	3	3	2	0	0
2020.08	1	0	0	2	7	1	0
	2	0	0	4	4	0	0
	3	0	0	2	6	0	0
2020.09	1	0	2	6	1	0	0
	2	0	2	6	2	0	0
	3	0	4	6	0	0	0

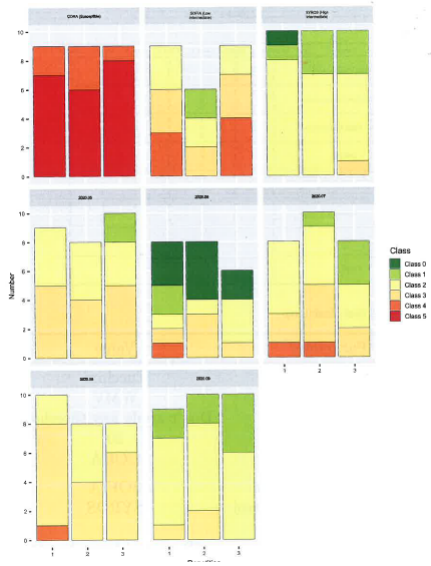
PATHOSTAT report, 3 chapters:

1. Resistance tests features
2. Comparison of distribution between repetitions
3. Study of susceptibility / resistance of varieties

Resistance test features

Parameter	Value
Species	Zucchini
Pathogen	WMV
Use of threshold	Don't apply any threshold
Number	20
Susceptible control	CORA
Intermediate control	SOFIA
High intermediate control	SYROS
Resistant control	
CTPS decision rule	IR control lower bound

Comparison of distribution between repetitions



Homogeneity regardless of the variety

- **Distribution of symptom per repetition:**

Repetition	Class 0	Class 1	Class 2	Class 3	Class 4	Class 5
1	4	5	29	19	8	7
2	4	8	28	19	4	6
3	2	12	25	18	5	8

- **Chi-squared test:**

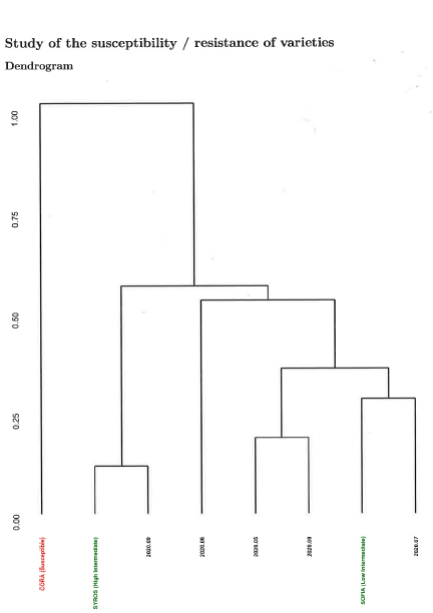
Table 3: Pearson's Chi-squared test: `pooled data`

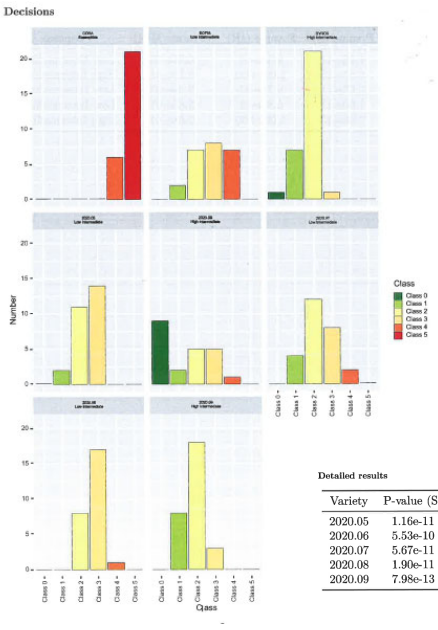
Test statistic	df	P value
5.831	10	0.8292

- **Results of the test:** Homogeneity of the distribution of symptom between repetitions

Homogeneity for each variety

Variety	P-value	Result
CORA (Susceptible)	8.42e-01	Homogeneity of repetitions
SOFIA (Low Intermediate)	3.32e-01	Homogeneity of repetitions
SYROS (High Intermediate)	6.12e-01	Homogeneity of repetitions
2020.05	6.46e-01	Homogeneity of repetitions
2020.06	5.06e-01	Homogeneity of repetitions
2020.07	5.59e-01	Homogeneity of repetitions
2020.08	6.14e-01	Homogeneity of repetitions
2020.09	6.70e-01	Homogeneity of repetitions





Detailed results

Variety	P-value (S)	P-value (IR)	P-value (HIR)	Proposal
2020.05	1.16e-11	9.55e-01	6.05e-05	Low Intermediate
2020.06	5.53e-10	1.00e+00	8.79e-01	High Intermediate
2020.07	5.67e-11	9.78e-01	2.29e-03	Low Intermediate
2020.08	1.90e-11	6.84e-01	2.63e-07	Low Intermediate
2020.09	7.98e-13	1.00e+00	2.68e-01	High Intermediate

[End of Annex and of document]