

tissus sous-épidermiques de la tige et les parties ne portant pas de glandes, n'ont pas ce goût amer.

Nous avons trouvé des glandes semblables aux précédentes, sécrétant des substances amères dans le *Salvia involucrata* Cav.

#### ΠΕΡΙΛΗΨΙΣ

Συνεχίζοντας τὰς ἐπὶ τῶν πικρῶν φυτικῶν οὐσιῶν ἐρεύνας μας διεπιστώσαμεν τὴν ὑπαρξίν πικρῶν οὐσιῶν εἰς εἶδη τινὰ τῆς οἰκογενείας τῶν Χειλανθῶν. (*Coleus Blumei*, *Salvia involucrata*), Αἱ οὐσίαι αὗται, ὡς ἐμφαίνεται ἐκ τῶν ἡμετέρων ἐρευνῶν, ἐκκρίνονται ὑπὸ ἀδένων εὐρισκομένων ἐπὶ τῆς ἐπιδερμίδος τοῦ βλαστοῦ καὶ τῶν φύλλων. Αἱ ρίζαι ὡς καὶ οἱ ὑπὸ τὴν ἐπιδερμίδα κείμενοι ἴστοι τῶν ὑπεργείων μερῶν στεροῦνται πικρῶν οὐσιῶν.

#### ΑΝΑΚΟΙΝΩΣΕΙΣ ΜΗ ΜΕΛΩΝ

**ΦΥΤΟΠΑΘΟΛΟΓΙΑ. — Comparative resistance of wheat varieties to *Tilletia levis* Kühn in Greece\*, by C. A. Apostolides.<sup>1</sup>** Ἀνεκρινώθη ὑπὸ κ. Ἰω. Πολίτου.

Stinking smut of wheat due to *Tilletia levis* Kühn and *Tilletia tritici* (Bjerk.) Wint., is one of the most important disease of wheat and second only to the rusts in its destructiveness.

The varietal resistance of wheats to bunt and the differences in susceptibility has been studied by Gaines (2) Stakman (9) Briggs (1) Rodenhiser (7) Reichert (6) and several other investigators throughout the world. Attention has been called, by these investigators, to the fact that, although, there are great differences concerning the susceptibility in the different varieties within the common group of wheat, the durum group seems to be more resistant than the other wheat groups.

#### MATERIALS AND METHODS OF EXPERIMENTATION

Twenty two most common Greek varieties of wheat and twelve others of foreign origin, introduced to Greece at different times, some varieties of the latter group being quite extensively used throughout Greece, were

\* Κ. Α. ΑΠΟΣΤΟΛΙΔΟΥ.— Συγκριτικὴ μελέτη, γενομένη ἐν Ἑλλάδι, ἀφορῶσα τὴν ἀντοχὴν ποικιλιῶν σίτου κατὰ τοῦ δαυλίτου (*Tilletia levis* Kühn).

<sup>1</sup> The writer wishes to acknowledge his indebtedness to Professor S. Papandreou, of the Superior School of Agriculture of Athens, for supplying the wheat varieties.

employed in our experimentation. The seed was inoculated uniformly with spores of *Tilletia levis*, obtained from Keratea, in erlenmeyer flasks by shaking seeds and smut spores for five minutes. All the experiments were carried out in duplicates and each variety was accompanied by a check. The seeding was done by hand in rows one meter in length and 20 centimeters apart from each other. The percentage of infection (Table 1 and 2) is based on 55,000 counted heads of wheat of all the varieties used in our experiments. For each variety we had approximately 200 heads.

The seeding for the experiments in Trahones for the year 1933-1934 was done on the 29th of November in a practically dry sandy-soil, while the seeding for the experiments of Kopais was done on the 10th, of December in sandy-loam-soil, practically saturated with moisture. After the seeding was done, in the latter case, it rained very heavily for almost a month. The seeding for the experiments of Pyrgos-Basilissis for the year 1934-1935 was conducted on the 5, 6 and 7th, of December in a sandy-loam-soil with plenty of moisture. Following the seeding it rained quite heavily for more than 20 days and as a result we had a super-saturated soil.

## RESULTS

An analysis of the experimental data tabulated in (Table 1 and 2), indicates that there is considerable variation in the percentage of infection within each group of wheat. The per cent infection in our case is influenced partly due to the load of inoculum Heald (8) and partly to soil moisture and temperature as well as to environmental conditions!

TABLE 1. — *Percentage of Infected plants by Tilletia levis based on Infected counted heads.*

Wheat Variety	1933-1934 Experiments in Trahones		1933-1934 Experiments in Kopais		1934-1935 Experiments in Pyrgos Basilissis	
	Infection		Infection		Infection	
	1-250 <sup>1</sup>	Check	1-250	Check	1-250	Check
Gremmenia	16.1	1.4	3.0	0	17.6	0.4
Mavragani	6.0	0.1	1.0	0	30.3	0.9
Mentana	47.0	1.5	5.0	0	32.1	1.9

Under the *Triticum durum* group we have two varieties quite resistant, the *Arapico* with an average infection of 0.16% and the *Deves*

<sup>1</sup> One gram of smut spores in 250 grams of wheat grains.

with 4.3%. In the *Triticum vulgare* group we have also two resistant varieties, the Katranitsa with an average infection of 3.6% and the Florence with 3.2%. All the other varieties belonging to the genus *Triticum* and the species *polomicum*, *turgidum* and the five other unidentified varieties show certain resistance, but not of any great economic importance.

#### DISCUSSION

Since all the 34 varieties used in our experiment possess a certain resistance to *Tilletia levis*, we assume that this resistance is due to inherited characters Briggs (3) and that the external morphological characters do not play any important role in the resistance of the varieties. Therefore, breeding bunt-resistant varieties of wheat should be of great importance in the control of the fungus.

The following four varieties of wheat, Redit, Hussar, Martin and White-Odessa, very highly resistant to *Tilletia levis* and *Tilletia tritici*, in the United States of America, after several years of experimentation, were infected, some more and other less, when they were inoculated with spores of *Tilletia levis* and *Tilletia tritici* from different regions of the United States as well as from Europe and other parts of the world. This breaking down of the resistance of these varieties is due according to Gaines (2) Reichert (6) Rodenhiser (7) Holton (4) Reed (5) and Römer (8) to the presence of virulent physiologic forms of the fungus.

Rodenhiser (7) in Minnesota in investigating the resistance to bunt of several wheat varieties, using as inoculum always the same kind of spores of *Tilletia*, was not able to obtain at all times the same per cent of infection. Certain varieties of wheat which were mentioned by other investigators as very resistant, he found them very susceptible.

Similar observations we have noticed in our experiments with the varieties, Mentana, Mavragani and Gremmenia as indicated in (Table 1). The differences in infection of the different varieties of wheat employed in our experiment for the years 1933-1935 can be attributed only to soil moisture and temperature as well as to other favorable climatic conditions during the period of growth and primary development of the plants and not to the presence of any physiologic forms of the fungus. Thus we see that the degree of moisture and temperature of the soil plays a very important role in the infection of the plant and the development of the

TABLE 2.—Percentage of Infected Different Varieties of Wheat by *Tilletia levis*.

Wheat Variety	I n f e c t i o n							Check
	1-50	1-100	1-250	1-500	1-1000	1-1500	1-2000	
<b>Triticum durum</b>								
Arnaout	78.7	50.6	47.5	35.3	34.4	27.0	26.7	0
Arapico	0.54	0.58	0	0	0	0	0	0
Gremmenia	40.0	28.4	17.6	16.0	15.5	8.8	4.0	0.4
Diminitis Samou	43.7	39.6	36.4	30.5	17.4	11.5	10.3	0.8
Kamboura	46.4	43.4	34.6	21.3	19.6	14.5	4.3	0
Kyperounta	28.6	23.3	21.0	14.6	11.9	9.8	6.1	1.5
Mavragani katerinis	46.3	38.0	30.3	18.7	15.2	14.3	13.7	0.9
Monologi	35.1	23.4	21.7	17.0	13.8	7.3	4.8	0.9
Deves	13.3	6.8	4.3	3.2	1.6	1.0	0	0
Psathas	48.9	41.1	32.5	29.7	21.6	15.8	15.6	2.1
<b>Triticum vulgare</b>								
Grinias	70.0	69.7	65.0	62.9	49.1	41.7	32.0	1.7
Katranitsa	7.0	6.0	5.4	4.0	2.0	1.1	0.09	0
Malacos Serron	65.1	51.3	40.6	24.2	23.7	17.1	14.2	3.4
Mentana	52.4	43.6	32.1	30.2	22.7	19.8	15.2	1.9
Skilopetritis	64.2	57.4	55.2	48.9	28.5	17.0	15.2	0.8
Tsougrias	64.2	61.8	59.6	41.5	40.1	34.0	23.3	0
Campera	62.2	58.2	42.9	39.2	30.8	28.3	14.5	1.8
Cirre Menotti	38.5	30.8	26.8	12.9	9.8	6.8	5.9	0
Cologna Razza	46.0	40.0	32.3	28.6	22.0	21.6	9.5	2.1
Florence	15.6	2.5	2.1	1.5	0.3	0.2	0.2	0
Masolino	69.5	61.9	52.4	52.1	40.0	39.8	23.0	3.4
Rosario Stirpe	64.2	57.1	56.1	41.7	35.4	26.3	18.4	5.8
Semiaristato	55.9	51.3	45.1	44.2	41.7	33.2	21.6	5.7
Villa Glori	37.0	26.4	19.5	13.1	11.7	8.1	4.3	0.3
<b>Triticum polonicum</b>								
Leventis Messaras	42.1	35.6	27.9	20.1	16.1	13.2	11.6	2.6
<b>Triticum turgidum</b>								
Asprostaro	31.0	31.0	26.5	26.3	17.0	13.3	11.5	1.2
Blahostaro	61.1	61.0	49.4	47.4	42.1	33.5	28.1	0
Kanaliotis	65.7	57.4	55.1	51.2	37.9	36.2	31.0	3.7
Kentradi	80.2	60.6	55.3	55.2	46.2	32.1	18.3	0
<b>Undetermined</b>								
Athalassa	30.2	23.9	22.0	17.3	11.4	10.3	8.6	4.4
Kokkinostaro	32.8	29.0	11.6	7.4	5.4	1.7	0.5	0
Ibrido 611	14.2	11.6	11.1	5.3	4.8	3.8	2.8	0.4
Ibrido 630	20.4	12.4	10.6	7.7	6.4	3.7	0.7	0
Ibrido 637	38.3	28.4	27.7	20.3	18.8	16.5	11.8	1.8

fungus. In heavy soils saturated with moisture as we had in our experiments of Kopais and Pyrgos-Basilissis, and if the moisture should last for over 25 days then we may have an injury to the spores of the parasite in such a degree that they will cease to develop.

This report is of preliminary nature and we have under way experiments for the coming year that will help us to further verify our present data. For the season 1935-1936 we have planted 60 other varieties of wheat, including the ones mentioned in this paper, for the study of their resistance to *Tilletia levis*. After we secure several other resistant varieties it is our desire to try their resistance to different physiologic forms of various *Tilletia levis* and *Tilletia tritici* collections from different parts of Greece.

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#### ΠΕΡΙΛΗΨΙΣ

Σκοπός τῆς παρούσης ἐρεύνης ἦτο νὰ καθορίσωμεν τὴν ἀνθεκτικότητα εἰς τὸν δαυλίτην τῶν κοινοτέρων ἑλληνικῶν ποικιλιῶν σίτου καθὼς καὶ μερικῶν ξένων τοιούτων χρησιμοποιουμένων εἰς τὴν ἑλληνικὴν γεωργίαν. Ὁ σπόρος τοῦ σίτου δι' ὅλας τὰς ποικιλίας ἐμολύνθη ὁμοιομόρφως, ὡς ἐμφαίνεται εἰς τοὺς πίνακας ἕνα καὶ δύο. Ἀπὸ τὰς 34 ποικιλίας, μὲ τὰς ὁποίας ἐπειραματίσθημεν μόνον αἱ ἐξῆς 4 ποικιλίαι, Ἀράπικο, Ντεβέξ, Κατρανίτσα καὶ Φλοράνξ παρουσιάζουν, κατὰ τοῦ δαυλίτου (*Tilletia*

levis) άντοχὴν ἀρετὰ σηµαντικὴν. Ἡ σπορὰ τοῦ σίτου ἐγένετο διὰ χειρὸς κατὰ γραµµάς, µήκους ἐνὸς μέτρου ἀπεχούσας ἀλλήλων 20 ἑκατοστὰ τοῦ μέτρου. Τὸ ἐπὶ τοῖς ἑκατὸν ποσοστὸν µολύνσεως ὑπὸ τοῦ δαυλίτου (Πίναξ 1 καὶ 2) καθωρίσθη κατόπιν καταµετρήσεως 54,000 στάχρων ὄλων τῶν ποικιλιῶν σίτου, οἵτινες ἐχρησιµοποιήθησαν κατὰ τὴν διεξαγωγὴν τῶν σχετικῶν πειραµάτων.

Αἱ διαφοραὶ τὰς ὁποίας εὑροµεν εἰς τὸ ποσοστὸν µολύνσεως τῶν ποικιλιῶν Μεντάνα, Γρεµµενιᾶ καὶ Μαυραγάνι (Πίναξ 1) δύνανται ν' ἀποδοθοῦν εἰς διαφορὰς ὑγρασίας καὶ θερμοκρασίας τοῦ ἐδάφους, καθὼς καὶ εἰς εὐνοϊκὰς ἢ δυσµενεῖς συνθήκας τοῦ περιβάλλοντος, κατὰ τὴν περίοδον τῆς βλαστήσεως καὶ ἀρχικῆς ἀναπτύξεως τοῦ φυτοῦ.

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**ΑΚΤΙΝΟΜΕΤΡΙΑ. — Ἐπίδρασις τῆς νεφώσεως ἐπὶ τῆς διαχύτου ἀκτινοβολίας ἐν Ἀθήναις\*, ὑπὸ Λεων. Ν. Καραπιπέρη.** Ἀνεκοινώθη ὑπὸ τοῦ κ. Κωνστ. Μαλτέζου.

Ἡ διάχυτος ἀκτινοβολία ἐξαρτωµένη ἐκ τοῦ ὕψους τοῦ Ἡλίου ὡς καὶ τοῦ βαθμοῦ καὶ εἴδους τῆς νεφώσεως παρουσιάζει ποικίλας μεταβολὰς ἢ μελέτη τῶν ὁποίων λόγῳ τοῦ ἀπὸ κλιματολογικῆς ἰδίᾳ ἀπόψεως ἐνδιαφέροντος αὐτῶν, ἀπησχόλησε πλείστους ἐρευνητὰς (Angström, Dorno, Brazier, Vallot κ. ἄ.).

Σκοπὸς τῆς παρούσης μελέτης εἶναι ἡ ἔρευνα τῆς διαχύτου ἀκτινοβολίας µε οὐρανὸν νεφοσκεπῆ ἐν Ἀθήναις, ἐπὶ τῇ βάσει ἀκτινομετρικῶν παρατηρήσεων 30 ἐτῶν τῆς περιόδου 1904-1933, γενοµένων κατὰ τὴν 14<sup>ω</sup> ἐν τῷ Ἀστεροσκοπείῳ Ἀθηνῶν (ὑψ. 107 µ) διὰ τῶν ὑπ' ἀριθ. 669-670 καὶ 671-672 ἀκτινομέτρων Arago, τῶν ὁποίων τὰς ἐνδείξεις ἀνηγάγοµεν συγκριτικῶς εἰς θερµίδας, διὰ παρατηρήσεων τοῦ ὑπ' ἀριθ. 48115 πυρηλιομέτρου Angström.

Ἐσχηµατίσαμεν οὕτω τὸν κατωτέρω πίνακα ὅστις περιλαµβάνει εἰς µικροθερµίδας (calories) κατὰ λεπτὸν τὰς ἐξαχθεΐσας μέσας µηνιαίας τιµὰς τῆς διαχύτου ἀκτινοβολίας µε οὐρανὸν νεφοσκεπῆ 1<sup>ον</sup> ὑπὸ διαφόρων νεφῶν (Id), 2<sup>ον</sup> ὑπὸ κατωτέρων ἢ νεφῶν τῶν ἀνοδικῶν ρευµάτων (Ib), 3<sup>ον</sup> µε βροχὴν (Ip), ὡς καὶ τὰς τιµὰς τῆς ὀλικῆς ἀκτινοβολίας µε οὐρανὸν αἴθριον (I) πρὸς σύγκρισιν τῶν προηγουµένων ἀκτινοβολιῶν.

Διερευνῶντες τὰς ἀνωτέρω τιµὰς παρατηροῦµεν ὅτι ἡ διάχυτος ἀκτινοβολία µε οὐρανὸν νεφοσκεπῆ ὑπὸ διαφόρων νεφῶν ἐν Ἀθήναις λαµβάνει τὰς µικροτέρας αὐτῆς τιµὰς κατὰ τοὺς µῆνας Νοέµβριον, Δεκέµβριον καὶ Ἰανουάριον, τὰς δὲ µεγαλυτέρας κατὰ τοὺς µῆνας τοῦ θέρους, ἐν ἀντιθέσει πρὸς τὴν ὀλικὴν ἀκτινοβολίαν µε οὐρανὸν αἴθριον, ἥτις κατὰ τοὺς µῆνας τοῦ θέρους λαµβάνει τὰς µικροτέρας τιµὰς τῆς.

\* L. CARAPIPÉRIS. — Influence de la nébulosité sur la radiation diffuse à Athènes.