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Torulopsis wickerhamii nova species

A new yeast from silage

by

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With 1 Figure in the text

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In the microbiological analysis of a mixture of olive husks, molasses, and whey used for silage, I was able to isolate 63 yeast cultures which I identified as 9 different species (1957). Two of them belonging to the genera *Torulopsis* and *Zygosaccharomyces* are different from the species up to this time described and therefore have been regarded as new species[1].

This paper gives a complete description of the species reported to the genus *Torulopsis* which I propose to denominate *Torulopsis wickerhamii* in honour of Professor L. J. WICKERHAM of Northern Regional Research Laboratory at Peoria Illinois (U.S.A.).

Description

Origin of strains. 22 strains were investigated, all isolated from a mixture of olive husks (100 Kg.), molasses (2,5 Kg.), whey (15 liters) used for some conservation tests in half underground silos in wall-like structure. 3 strains were isolated at the silage time, while the 19 other strains were isolated from the same 45 days old mixture.

Technical procedure. The technical procedure for the determination of the characters was that of STELLING-DEKKER (1931) and LODDER and KREGER-VAN RIJ (1952) except for the method concerning the study of sugar assimilation. For this determination a method using cooked and washed agar, as already described by the author (1955), was considered more suitable.

Growth in malt-extract. After 3 days at 25° C., cells globose or slightly elliptical, (3—5,5) · (3,5—6) microns, single or in pairs and even in little clusters. Slightly turbid liquid, fermentation and very scarce sediment. After one month at 22—25° C., a sediment, transparent liquid and a superficial ring are formed.

Growth in grape-must. After 3 days at 25° C., the cells are globose or slightly oval, (3—5,5) · (3,2—6) microns, single or in pairs and in little groups; the liquid is rather limpid, with weak fermentation. The sediment is absent or scarcely formed. After one month at 22—25° C., the liquid is limpid with a sediment and a thin ring.

Growth on malt agar. After 3 days at 25° C., cells globose, round or slightly oval, (2—5) · (2,6—5,5) microns, single or in pairs, budding. After one month at 17° C., the streak culture is white-greyish, soft, rather mucous, glistening, moistened, smooth, rather flat, not abundant. Margin smooth. In the old cultures the streak

[1] I am obliged to Mrs. N. J. W. KREGER-VAN RIJ (Delft) for confirming this conclusion.

culture presents the same characters, but acquires a white-yellowish tonality and becomes decisively waxen.

Growth on carrot agar. After 3 days at 25° C., the cells are globose, round or slightly elliptical, (2—5) · (2,6—5) microns, single or in pairs, budding. After one month at 17° C., the streak culture is rather abundant, whitish, soft, rather mucous, glistening, moistened, smooth. Margin smooth.

Growth on bean agar. After 3 days at 25° C., the cells are small, globose or slightly elliptical, (2—5) · (2,6—5) microns, single or in pairs, budding. After one month at 17° C., the streak culture is very scarce, whitegreyish, cream-like, glistening flat, smooth. Margin smooth.

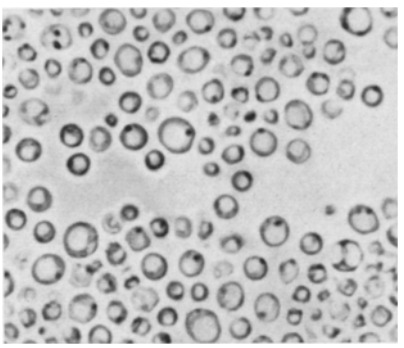

Fig. 1. *Torulopsis wickerhamii* nov. spec. (after 3 days in malt-extract). × 800

Growth on beef-extract agar. No growth.

Infixed culture on must gelatine. After 45 days at 20° C., positive liquefaction first in funnel-shape, then in cylinder-shape.

Slide culture. No pseudomycelium.

Growth in milk. No growth.

Fermentation. Glucose +; galactose —; maltose —; sucrose —; lactose —; raffinose —; inulin —; dextrine —.

Sugar assimilation. Glucose +; galactose +; maltose — or ±; sucrose —; lactose —; raffinose —.

Assimilation of N-substances. Ammonium sulphate +; potassium nitrate + asparagine +.

Ethanol as sole source of carbon. Very weak.

Splitting of arbutine. Positive.

Fermentative power. In normal grape-must ($p_H = 3{,}5$), 2 to 3,87 vol.-% alcohol.

Discussion

The fact that this microorganism has globose cells, does not form spores nor pseudomycelium, assimilates potassium nitrate and splits arbutine, demonstrates that it belongs systematically according to STELLING-DEKKER (1931), LODDER (1931) and LODDER and KREGER-VAN RIJ (1952) to the genus *Torulopsis*. According to the above mentioned authors the species up to this time described as *Torulopsis* which ferment only glucose, are: *T. molischiana* (Zikes) Lodder; *T. glabrata* (Anderson) Lodder and De Vries; *T. candida* (Saito) Lodder; *T. famata* (Harrison) Lodder and Kreger-Van Rij; *T. ernobii* Lodder and Kreger-Van Rij; *T. inconspicua* Lodder and Kreger-Van Rij.

The table 1 indicates the distinguishing morphological and physiological characters of the above mentioned species together with those of *Torulopsis wickerhamii* nova species.

The data show that *Torulopsis wickerhamii* nova species is different: from *T. molischiana* (Zikes) Lodder because it assimilates galactose and

Table 1

	Torulopsis molischiana	*Torulopsis glabrata*	*Torulopsis candida*	*Torulopsis famata*	*Torulopsis ernobii*	*Torulopsis inconspicua*	*Torulopsis wickerhamii*
Shape of cells	oval	oval	round	round or oval	round	oval	round or oval
Dimension of the cells in malt extract	(2—4,5) · (2,5—6)	(2,5—3,5) · (4—5)	(2,5—4) · (3—6,5)	(2,5—5,5) · (3,5—7)	(2,6—4,3) · (3,4—5,2)	(2—3,5) · (3—6)	(3—5,5) · (3,5—6)
Fermentation: glucose	+	+	+ weak	—or + very weak	+ weak	—or + weak	+
galactose	—	—	—	—	—	—	—
maltose	—	—	—	—	—	—	—
sucrose	—	—	— weak and occasionally	—	—	—	—
lactose	—	—	—	—	—	—	—
raffinose	—	—	—	—	—	—	—
Assimilation: glucose	+	+	+	+	+	+	+
galactose	—	—	+	+	—	—	+
maltose	+	—	+	+	+	—	— or ±
sucrose	—	—	+	+	+	—	—
lactose	—	—	+ weak occasionally	—	—	—	—
raffinose	—	—	—	—	—	—	—
Potassium nitrate assimilation	—	—	—	—	—	—	+
Ethanol as sole carbon source:	±	—	+	±	±	±	±
Splitting of arbutine:	+	—	+	variable	—	—	+
Fermentative power (vol.-%alcohol)	4.03	7.45—9.63	0,4	0—2.15	0.45—0.67	0—0,4	2— 3.87

potassium nitrate;—from *T. glabrata* (Anderson) Lodder and De Vries because it assimilates galactose and potassium nitrate and splits arbutine;—from *T. candida* (Saito) Lodder because it does not assimilate and ferment sucrose, does not assimilate lactose and assimilates potassium nitrate;—from *T. famata* (Harrison) Lodder and Kreger-Van Rij because it ferments strongly glucose, does not assimilate sucrose and assimilates potassium nitrate;—from *T. ernobii* Lodder and Kreger-Van Rij because it ferments glucose, assimilates galactose, does not assimilate sucrose, assimilates potassium nitrate and splits arbutine;—from *T. inconspicua* Lodder and Kreger-Van Rij because it ferments glucose, assimilates galactose, assimilates potassium nitrate and splits arbutine.

Two strains of *Torulopsis wickerhamii* nova species were sent to C.B.S. of Delft, while 9 strains were put into the yeast collection of the Institute of Agricultural and Technical Microbiology of the University of Perugia (Italy).

Latina Diagnosis

Torulopsis wickerhamii nova species

In malto trium dierum, cellulae globosae vel leviter obovatae (3—5,5) · (3,5—6) micron, singulae vel binae aut acervatim paucis elementis constitutae, gemmantes. Elapso mense fit sedimen, medium nitidum et corona in superficie.—Maltato in agaro cellulae globosae vel leviter ellipticae (2—5) · (2,6—5,5) micron, singulae vel binae, gemmantes.—Peracto mense pellicula cineracea, speciem floris lactis perferens, levigata, fere aequa, marginibus puris, sat copiosa conspicitur.—Pseudomycelium non gignit. Concretum jus fluens efficit. Sporas minime quidem efformat.—Glucosum fermentatur et assimilatur. Galactosum et maltosum (languide) assimilantur.—Sal nitras kalicus assimilatur.—Parum augescit alcohole aethylico ut unum carbonii pabulum.—Gignit 2—3,87% aethylici alcoholi.—E terra sejuncta fuit.

Summary

A new species of *Torulopsis* is described; it was isolated from some materials used for silage. This species is named *Torulopsis wickerhamii* nova species in honour of Prof. L. J. WICKERHAM of Northern Regional Research Laboratory at Peoria-Illinois-U.S.A.

References

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