MASS PRODUCTION OF "CUITLACOCHE" (*Ustilago maydis*). FROM SEASONAL HARVESTING TO CONTROLLED CULTIVATION

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Introduction. Cuitlacoche is an edible fungus considered a delicacy in central Mexico; it develops as smut galls on ear corns infected by *Ustilago maydis* (D.C.) Corda. Fresh cuitlacoche has been traditionally sold in local markets during the rainy season [1]. Some factors of the interaction between corn plant and fungal parasite have been identified to be crucial for successful infection [2], i.e. stage of stigma development, pollination, inocula preparation and timing for inoculation.
Experiments were carried out with different maize cultivars to evaluate development of infection, agronomic performance and sensorial attributes of the product.

Methods. Male sterile corn hybrids were tested at the University of Illinois experimental fields. Experiments in central Mexico tested open pollination corn hybrids suited for high altitude valleys. Severity of infection, size and weight of galls, husk protection, corn ear size, time for silk appearance and gall maturation were recorded. Sensorial attributes of Cuitlacoche obtained from experiments in central Mexico were assessed [1].

Results. Male sterile corn hybrids showed high infection rates with inocula prepared by mixing 25 h liquid cultures of compatible strains *a1b1* and *a2b2* and by inoculating corn plants 2 days after silk emergence. Infected ear corns weighted from 470 to 735 g; gall quality and husk protection varied among hybrids

Table 1 Husk protection and gall quality (1 to 5) of male sterile hybrids.

Hybrid	Husk protection	Gall quality
Most suitable hybrids		
3153RR	4.54	3.53
3356BT	4.42	3.43
2730	4.28	3.00
3977	4.20	3.19
2656	4.19	2.86
Least suitable hybrids		
2024	3.79	2.60
2296	3.68	2.74
1680	3.67	2.80
3028	3.43	2.47
2295	3.32	2.56
FLSD 0.05	0.56	0.51

Male sterile hybrids better suited for a commercial cuitlacoche production showed to be 3153RR, 3356BT and 3977 (Table 1).
High altitude corn hybrids tested in Mexico, showed high infection rates and excellent husk protection, gall quality, silk emergence and weight of kernel galls (Table 2). Hybrid 910 with the highest productivity, 326 g kernel galls per plant, showed a high sweetness flavor but at the same time, it resulted highly bitter. This represents an obstacle to be overcome in order to match consumer preferences and deliver a commercially viable product.

Table 2. Sensory and agronomic attributes to high altitude corn hybrids

Corn Hybrid	Attribute: Flavor: Sweet	Attribute: Flavor: Bitter	Time after planting (days): silk	Weight (g): Kernel galls	Severity of infection (%)	Husk protection	Gall quality
Aspros 820	2.88 ± 0.53^{a}	4.42 ± 1.33^{def}	72 ± 2.0^{de}	164.7 ± 55.6^{bc}	94.1 ± 7.9^{bc}	4.1 ± 0.7^{cd}	2.2 ± 0.7^{abc}
948	3.46 ± 0.84^{abcd}	4.25 ± 1.08^{def}	83 ± 3.0^{bcde}	185.3 ± 48.7^{abc}	86.1 ± 13.9^{a}	3.9 ± 0.6^{ab}	2.3 ± 0.6^{abcd}
Aspros 1501	3.56 ± 0.70^{abcde}	3.6 ± 0.48^{bcde}	75 ± 6.5^{cabcd}	163.7 ± 32.2^{ab}	92.7 ± 10.9^{ab}	3.9 ± 0.6^{ab}	2.0 ± 0.4^{abcde}
Aspros 910	4.29 ± 0.78^{efg}	4.38 ± 0.96^{ef}	83 ± 1.9^{abc}	326.6 ± 79.1^{d}	97.9 ± 2.4^{bc}	4.5 ± 0.5^{de}	3.1 ± 0.5^{e}
Aspros 905	4.54 ± 1.01^{fg}	4.21 ± 1.42^{def}	73 ± 0.5^{abc}	139.0 ± 26.0^{a}	96.3 ± 3.9^{bc}	4.0 ± 0.7^{cd}	2.0 ± 0^{ab}

^{abc} Different letter indicates statistically significant difference between values of different samples in a column.

Conclusions. Development of infection, agronomic characteristics and sensorial attributes of the product are highly dependent of maize cultivar. In order to develop a commercially viable process, sensorial attributes have to be assessed and matched with good agronomic performance for a particular microclimate and soil condition.

References.

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