

* *Ustilago maydis*

HISTOPATHOLOGY OF CORN INFECTED BY *Ustilago maydis* CASUAL AGENT OF COMMON CORN SMUT

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Ustilago maydis

% + PDA CMA

°C

Ustialgo

Ustilago maydis :

.(Day & Anagnostakis 1971)

. *Ustialgo maydis* (D.C.) Corda

.(Pyghami 2002)

.(Snetselaar & Mims 1993)

Habibi & zamani 2003)

(Snetselaar & Mims 1993, 1994)

.(Perez-Martin *et al.* 2006 Christensen 1963

.(Snetselaar & Mims 1993, 1994)

.(Okhovat 1999)

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.(Sharifnabi & Nekooii 1994)

.(Snetselaar & Mims 1994)

Day & Anagnostakis)

.(Sampson 1939 1971

.(Kahmann & Kamper 2004)

.(Agrious 2005)

.(Day & Anagnostakis 1971)

.(Day 1974)

% /

PDA CMA

Zamani & Sabzi 2000)

.(Zamani & Estakhr 2007 and Zamani & Estakhr 2004

°C

.(Zamani & Sabzi 2000 Thakur *et al.* 1998)

(Snetselaar & Mims 1993 Naien 1979)

.(Snetselaar & Mims 1994)

Zamani & Sabzi Snetselaar & Mims 1993)

Zamani & Zamani & Estakhr 2004 2000

Zamani & Estakhr *et al.* 2007 Estakhr 2007

) ()

.(Ghaedrahmat *et al.* 1999 Habibi 1999

(

.(Snetselaar & Mims 1994)

(Thakur *et al.* 1987)

(D)

(Appressorium)

(B)

(C)

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(B)

(FPA: Formalin Propionic acid Alcohol)

(Bauer *et al.* 1997)

(D)

(FAA:Formalin Acetic acid Alcohol)

U. maydis

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%

(%)

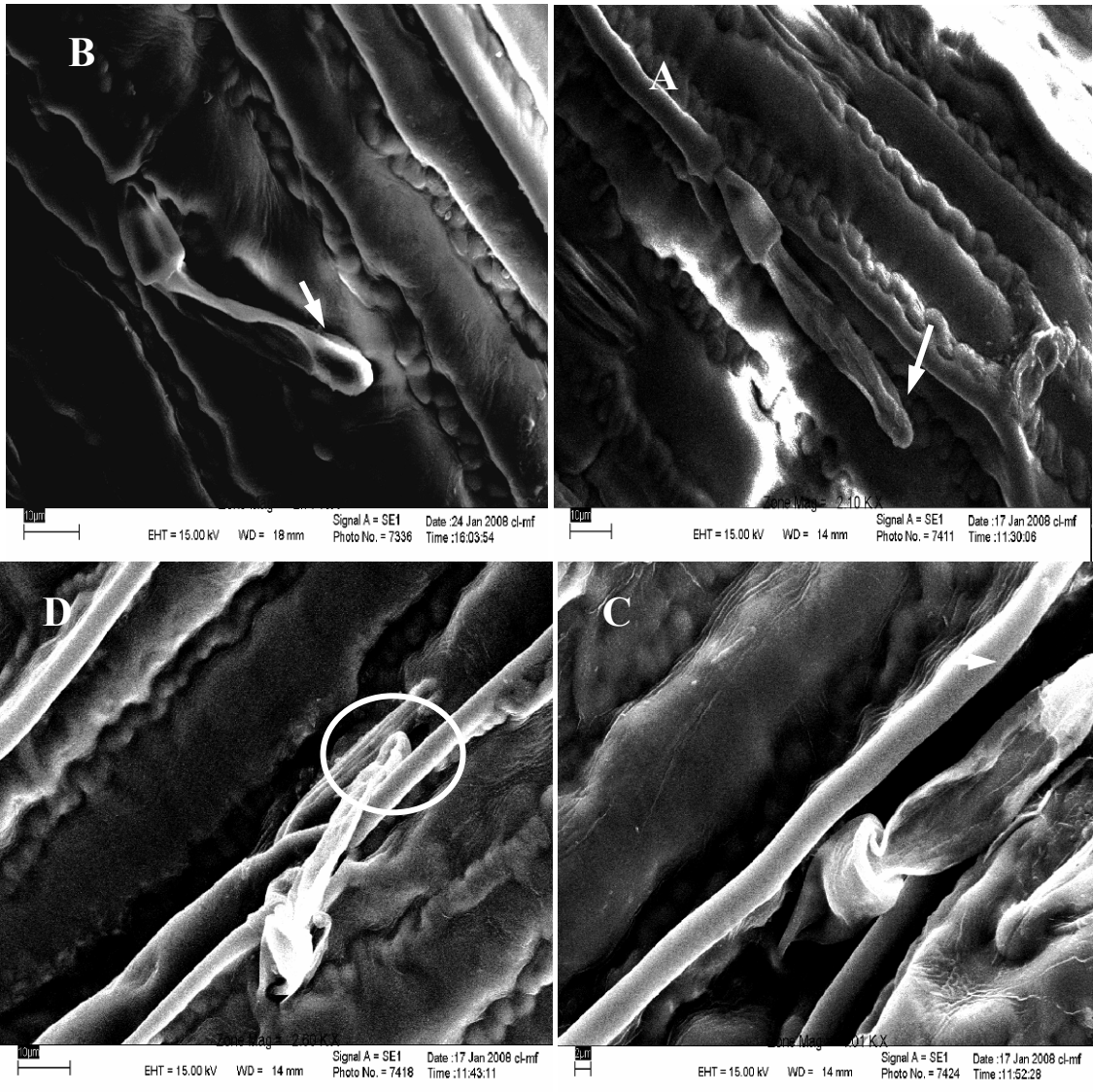
(Khalil & Abou-Heilah 1985)

O

(Kue 1991)

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$\alpha = /$



:A .

Ustilago maydis

:B . () .

:C . ()

:D .

(

Fig. 1. Scanning electron microscopy of *Ustilago maydis* hyphae penetration in maize leaves. A: sporidium germination on different parts of plant. (place of stoma mark with arrows). B: Most of the time appressorium form at the site of penetration (arrows). C: Direct penetration in leaf epidermic cells occur on a spray method inoculation. D: Stoma penetration on a spray method inoculation. Appressorium mark with arrow (photos made by author).

Ustilago maydis

(μm /) μm

Table1. *Ustilago maydis* hyphae position on different parts of contaminated plant inoculation with injection and spray method during disease development.
 - 7-12μm (~8.5μm) Section of embedded specimens.

		Percent of samples with hyphe in approximate level of sectioning in each varieties					
Days after inoculation (No.)	Samples sectioned (No.)	-		-		-	
		Injection	Spray	Injection	Spray	Injection	Spray
2	5	23	16	22	18	15	9
4	5	42	38	40	43	30	26
7	5	72	69	68	77	45	42
11	5	83	80	75	83	61	62
(25)	5	100	100	100	100	100	100

.()

()

(C)

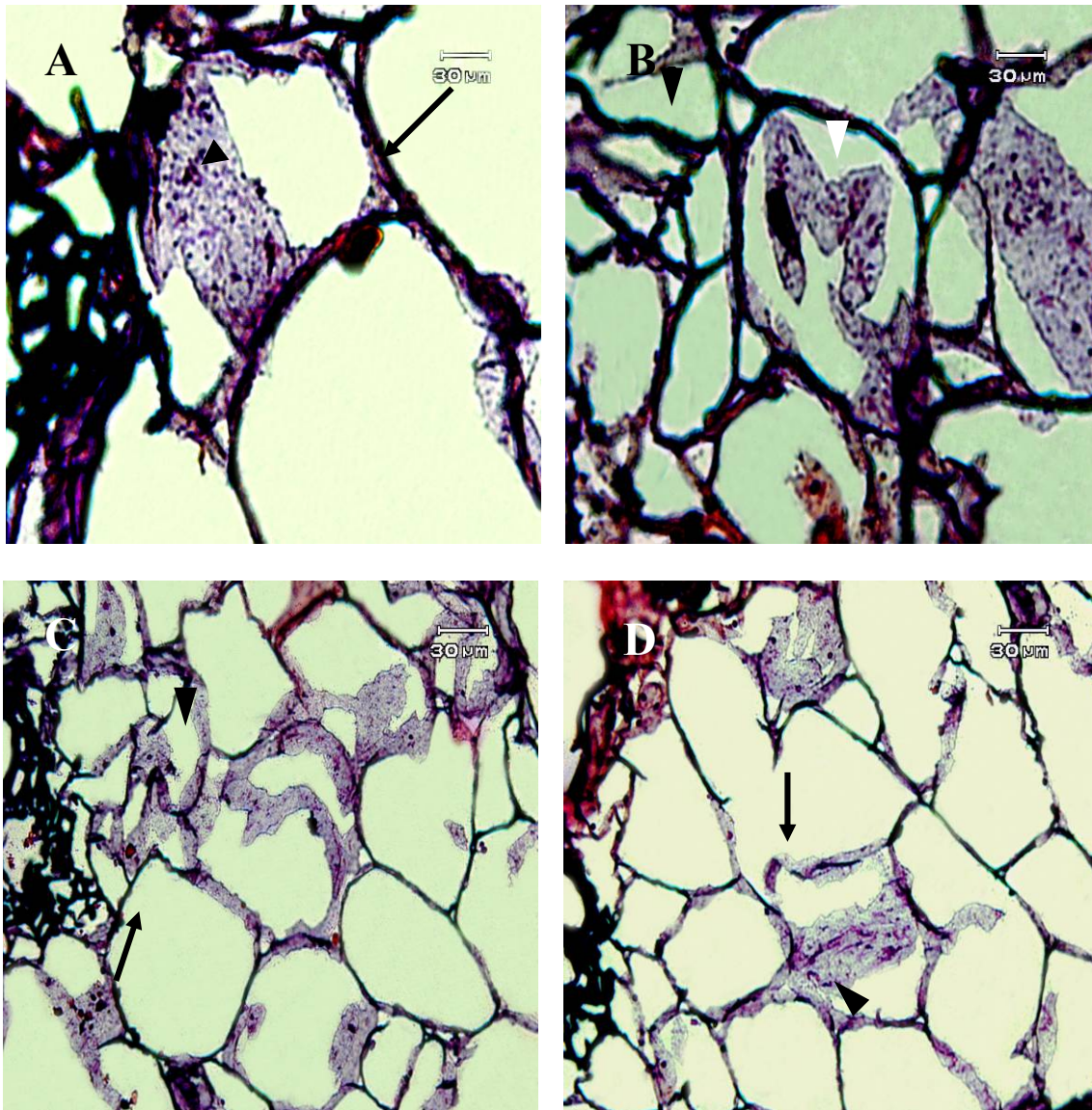
(D A)

.(B)

.()

 $\alpha = /$

Ustilago type



U. maydis

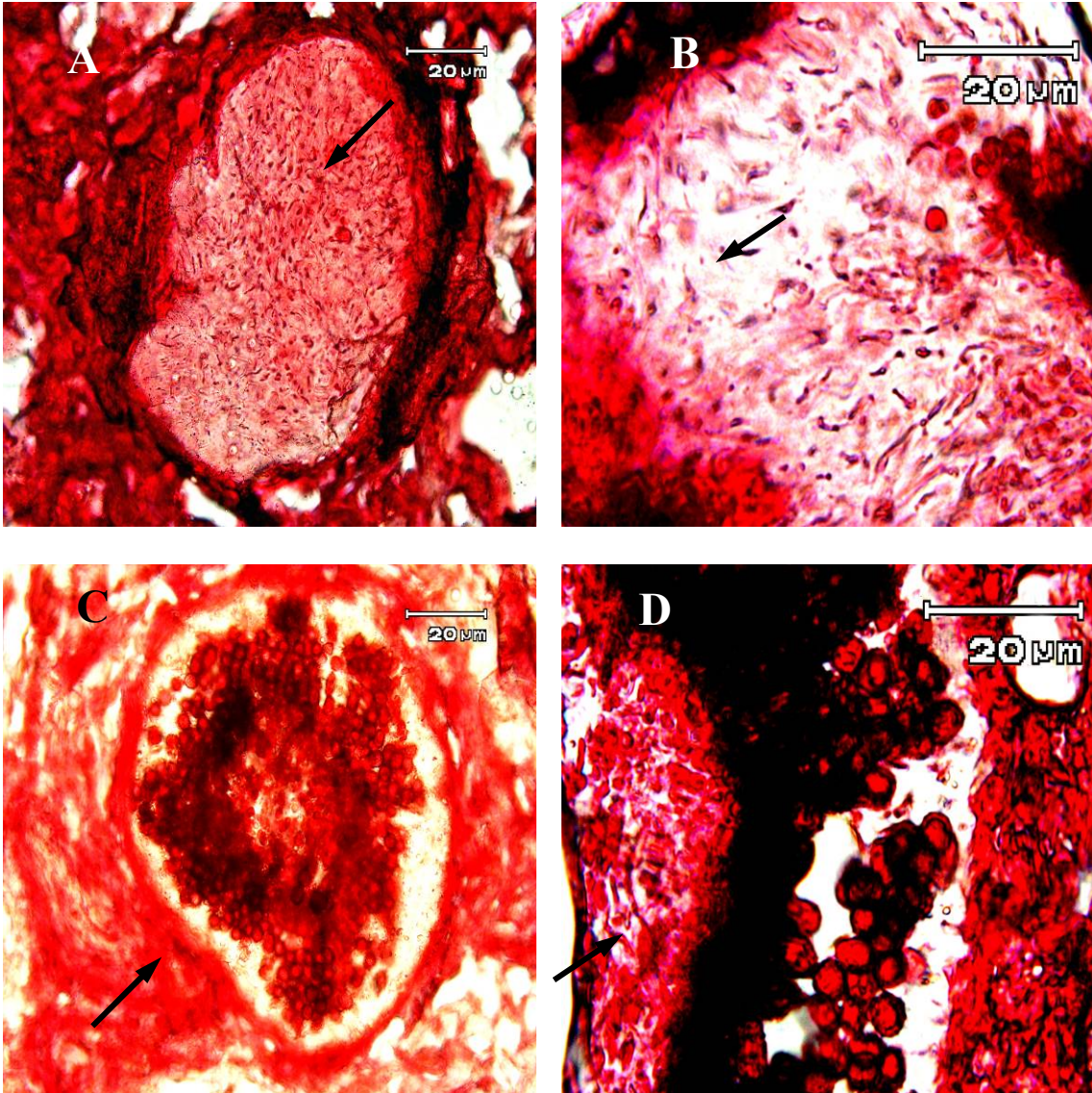
D A

C

B

()

Fig. 2. *Ustilago maydis* intra and inter cellular hyphae in maize 11 days after inoculation. Inter cellular hyphae shows with arrows and intra ones shows with arrowhead. Fig. A and D shows swollen intercellular hyphae. Finger like terminated hyphae shows on fig. B. hyphae seem to continue growing on fig. C (photos made by author).



B A
C
D
()

Fig. 3. Growing cells contain both mature and immature teliospores surrounded by gelatinous sheath. On fig. A and B growing cells contain immature teliospores that turn to mature ones. Teliospore formation on contaminated tissue is shown in fig. C. Sporogenous hyphae are shown with an arrow in fig. D (photos made by author).

(Pataky & Snetselaar 2006 Lutterll 1986 1993

(Christensen 1963)

(Christensen 1963)

(Pop & MaCarter 1992)

b a

Jalali & Mehriyan *et al.* 1999)

Zamani Zamani & Estakhr 2004 Sabzi 2000

Zamani & Estakhr *et al.* 2007 & Estakhr 2007

(Ghedrahmat *et al.* 1999 Habibi 1999

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Snetselaar & Mims)

(Lutterll 1986)

(1993, 1992

(Sabzi 1996)

U. maydis

Snetselaar & Mims)

(Snetselaar & Mims 1993)

(Scherer *et al.* 2006)

(Lutterll 1986)

Snetselaar)

(& Mims 1992

Snetselaar)

(Lutterll 1986)

(& Mims 1992, 1993

(Kahmann & Kamper 2004)

U. maydis

(Lutterll 1986)

(Snetselaar & Mims 1992, 1993)

(Hichcock & Norton 1896)

(Bannutt & Herskowitz, 1996)

(Doehlemonn *et al.* 2008)

(Lutterll 1986)

(Kharbush 1928)

(Bannutt & Herskowitz 1996)

(Snetselaar & Mims 1994)

(Bannutt & Herskowitz, 1996)

U. maydis

(Snetselaar & Mims 1993, 1994)

(Perez-Martin *et al.* 2006)

Ruiz-Herrera &)

(Martinez- Espinoza 1998

U. maydis

(Lutterll 1986)

Fisher &)

(Christensen 1963)

Snetselaar &)

(Holton 1975

(Mims 1992 1993