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## Effect of Different Temperature & Culture Media on Growth of *Drechslera maydis* (Niaikado) Subram & Jain

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**Abstract:** The effect of six different media and five different temperatures on *D. maydis* was studied. The mycelial colour on Czapek's Dox Agar medium and Corn Meal Agar were dark greenish white whereas Oat Meal Agar and Malt Extract Agar medium were light gray to black and PDA and Richard's medium were dark blakish white. Average maximum radial growth was observed in Czapek's Dox Agar medium and Oat Meal Agar medium and minimum radial growth in Malt Extract Agar medium. Average maximum radial growth was observed at 30°C and minimum at 40°C.

**Key words:** Maize, *Drechslera maydis*, Growth, Media, Temperature.

**Introduction:** Maize is the important crop of India belongs to grass family Poaceae, grown in 166 countries across the world (**Directorate of maize research 2012**). It is relatively a warm weather crop and widely grown in warmer parts of temperate and humid subtropical regions (**FAO 2013**). Global maize production was 967 million tons during 2014, from an area of 177million hectare with productivity of 5.5 tons per hectare (**FAO 2014**). India stands at 6<sup>th</sup> position with respect to production in the world (**Anon., 2012**). More than 115 diseases of maize have so far been reported from different parts of the world whereas about 65 are known to occurs in India (**GOI, 2009**) leading to about 9 per cent yield losses in maize due to disease (**Khokhor et al., 2014**). Southern leaf blight is most serious problem in Bundelkhand region caused by *Drechslera maydis* (Niaikado) subram & jain belongs to class deuteromycetes. *Drechslera* was established by **Ito (1930)**. *D. maydis* has been reported to cause a number of serious diseases in graminicolous plant. Leaf blight of maize was reported as a serious epidemic and threatened the corn growers in tropical region especially after the release of male sterile clones and causes 30 percent yield loss (**Payak and Sharma 1978**). Therefore the present study was made to understand the effect of different media and temperature on the growth of the pathogen.

## Method and Materials:

The effect of different media and temperature of the pathogen were studied under laboratory conditions. The colony of *D. maydis* were grown on PDA in Petri plates, when colonies filled the Petri plates, 4 mm diameter mycelial piece/disc, cut from colony margins, were transferred to the center of 90 mm Petri plates, each containing 20 ml media. For mycelial growth, six different commonly used synthetic and sterilized solidified media viz., Corn Meal Agar, Oat Meal Agar, Czapek's Dox Agar medium, Potato Dextrose Agar medium, Richard's medium and Malt Extract Agar were prepared as per recommended procedures. The selected medium were examined under incubated conditions at 20°C, 25°C, 30°C, 35°C and 40°C temperature. The observation on the colour of mycelium, colour of media at the growth point, mycelium emergence and growth of the fungus were recorded on 3<sup>rd</sup>, 7<sup>th</sup> and 10<sup>th</sup> day. The diameter of the resulting colonies was measured after 7 days of incubation. The growth of *D. maydis* (colony diameter) was measured with the help of Hi Antibiotic zone scale.

## Result and Discussion:

Fungal growth characters on different media are summarized in table 1. The growth was highly variable with regard to colony diameter and colony characteristic. Maximum growth was observed on czapek's medium and minimum in malt extract. The pathogen growing on czapek's and corn meal agar medium produced dark greenish white and superficially well developed colonies with thicker mycelia. Whereas on malt extract medium and oat meal agar medium produced light gray to black superficial colonies with thin mycelium. Colonies on Richard's medium and PDA were dark blackish white with superficial poorly branched. Colonies on czapek's dox and malt extract medium and oat meal agar were deeply submerged / embedded. (Fig-1) **Kumar and Rani (2009)** reported two media i.e., PDA and Richard's agar proved excellent for sporulation of *C. heterostrophus*. Environmental conditions greatly influence the growth and sporulation of *B. maydis* (**Warren, 1975; Almaguer et al., 2013**). Temperature is most important physical environment factor for regulating the growth and reproduction of the fungus. Effect of different temperature on the mycelia growth and sporulation of *D. maydis* was studied.

Effect on growth of *D. maydis* of different culture media viz. Czapek's Dox medium (CZA), Corn Meal Agar (CMA), Oat Meal Agar (OMA), Potato Dextrose Agar (PDA), Richard's medium, Malt Extract Agar (MEA) medium and temperature at 20°C, 25°C, 30°C, 35°C, 40°C is depicted in Fig. 2 & 3. The growth of colony showed an increasing trend with temperature but after 35°C it significantly reduced. The data indicated that over all maximum radial growth 74.8 mm were observed in CZA at 35°C temperature and minimum radial growth 7.0 mm in PDA at 40°C temperature. Individually maximum radial growth in CZA medium was also observed 74.8 mm at 35°C and minimum radial growth 07.4 at 40°C. In CMA medium maximum radial growth 57 mm were observed at 35°C and minimum growth 11.3 mm at 40°C. In OMA medium 71.0 mm maximum radial growth were observed at 30°C and minimum radial growth 12.2 mm at 40°C. In PDA medium maximum radial growth 64.0 mm were observed at 30°C and minimum 7.0 mm at 40°C. In Richard's medium maximum

radial growth 56.8 mm were observed at 30<sup>0</sup>C and minimum 11.4 mm at 40<sup>0</sup>C. In malt extract agar medium maximum radial growth 54.6 mm were observed at 30<sup>0</sup>C and minimum radial growth 9.2 mm at 40<sup>0</sup>C.

At 20<sup>0</sup>C maximum radial growth 40.6 mm were found in oat meal agar medium and minimum 30.6 mm in Richard's medium. At 25<sup>0</sup>C maximum radial growth 61.0 mm were found in oat meal agar and minimum 41.2 mm in corn meal agar medium. At 30<sup>0</sup>C maximum radial growth 73.2 mm were found in czapek's dox medium and minimum in 54.2 mm in corn meal agar medium. Maximum radial growth 74.8 mm was found in CZA medium and minimum 45.2 mm in MEA medium at 35<sup>0</sup>C. Maximum radial growth 12.2 mm was found in OMA and minimum 7.0 mm PDA medium at 40<sup>0</sup>C. Average maximum radial growth 62.30 mm were observed at 30<sup>0</sup>C and minimum 9.76 mm at 40<sup>0</sup>C. So 30<sup>0</sup>C is effective temperature for fungal growth. On average CZA medium and OMA medium were equally effective (49.28 and 49.08 respectively) and MEA shown poor radial growth (38.0 mm) at various temperature.

Many workers studied the growth of the pathogen. **Yamaguchi and Mutsunobu (2010)** reported a selective media for the growth of pathogenic fungi *Bipolaris*, *Drechsler* and *Exserohilum*, which has been developed based on potato extract broth. **(Naz et al., 2012)** studied that Richard's agar media was most effective supporting medium for the growth of *C. heterostrophus* followed by PDA, basal media, Corn meal agar and Czapek's medium while water agar was found to be the least effective. **Ali et al., (1992)** found similar trends they reported that out of five different incubation temperature (10, 20, 25, 30 and 35<sup>0</sup>C) the highest radial colony growth of fungus (87 mm) was recorded at 30 degrees centigrade. Among the three culture media, maize leaf agar proved to be the best culture substrate in showing the maximum colony growth (79.83 mm) and spore size (74 x 13 mm) of the fungus. **Pal and Kaiser (2003)** their findings that the mycelial growth and conidial germination of the pathogen *Drechslera maydis* Nisikado race 'O' were influenced by temperature, the optimum being 33<sup>0</sup>C. Relative humidity did not have impact on mycelial growth and conidial germination. The situation was true on the disease incidence recorded in the field. Linear growth in petri plates was maximum at 33<sup>0</sup>C, and minimum at 21 and 38<sup>0</sup>C. Below and above 33<sup>0</sup>C, mycelial growth gradually tended to decrease. Mycelial growth was good at 70-100% RH, but was optimum at 90-100%. Below 90% RH, colony growth was slow, conidial germination was also highest at 33<sup>0</sup>C. Germination percentage was high between 27 and 32<sup>0</sup>C, but gradually decreased below 27<sup>0</sup>C and above 33<sup>0</sup>C. *In vitro* studies indicate that linear growth and conidial germination were affected by both temperature and RH. During the experimentation, the daily mean maximum temperature was 32.5 and 32<sup>0</sup>C, the daily mean maximum RH was 96.2% and 97.0% and the total monthly rainfall was 347.0 and 437.5 mm, respectively. **Didvania et al., (2012)** reported that maximum mycelia growth and sporulation of genus *Helminthosporium* was obtained on PDA. The different colony characters varied on different media. Therefore it's concluded that the pathogen was best growth at 30<sup>0</sup>C in CZA medium and poor at 40<sup>0</sup>C in MEA medium.

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**Table 1: Cultural characteristics of *D. maydis* in different media.**

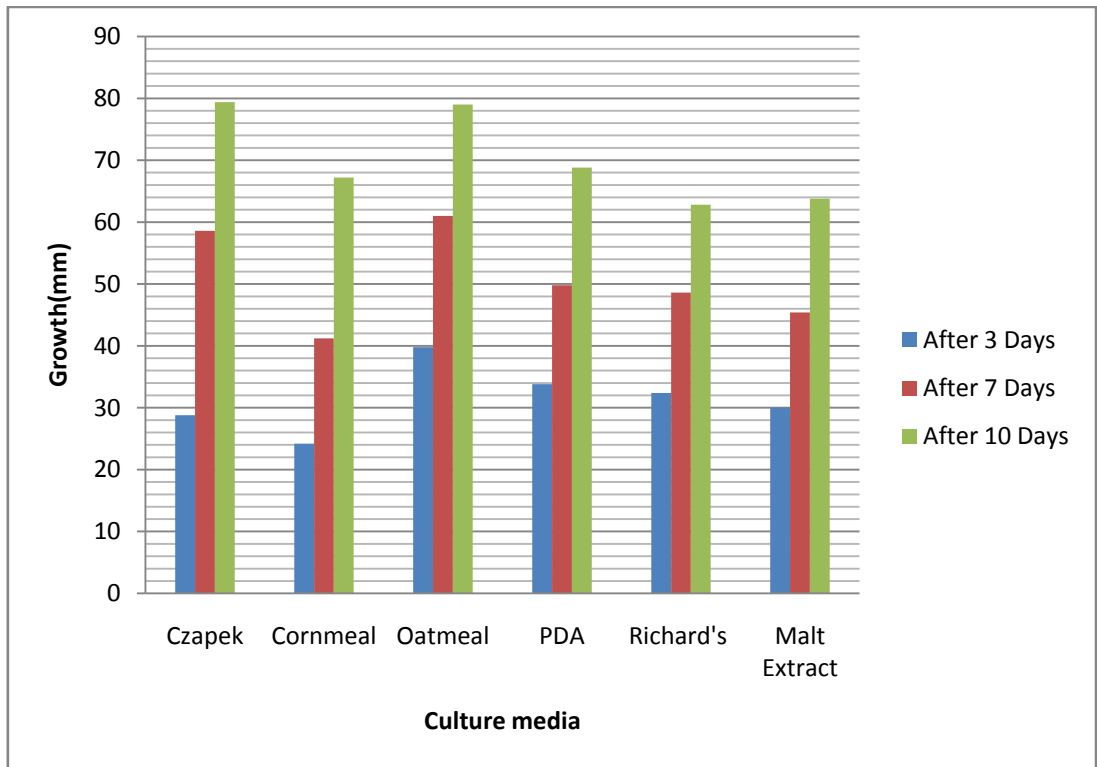
| S. No | Media                | Colour              | Growth                            |                 | Remark |
|-------|----------------------|---------------------|-----------------------------------|-----------------|--------|
|       |                      |                     | Superficial                       | Submerged       |        |
| 1.    | Czapek's Dox         | Dark greenish white | Well developed and branched       | Deeply embedded | +++++  |
| 2.    | Corn Meal Agar       | Dark greenish white | Well developed                    | Less developed  | +++    |
| 3.    | Oat Meal Agar        | Light Gray to black | Well developed Profusely Branched | Deeply embedded | +++++  |
| 4.    | Potato Dextrose Agar | Dark Blackish white | Developed poorly branched         | Less developed  | ++++   |
| 5.    | Richard's Medium     | Dark Blackish white | Developed poorly branched         | Less developed  | +++    |
| 6.    | Malt Extract Agar    | Light gray to black | Poorly branched                   | Deeply embedded | ++     |

++ Poor  
 +++ Average  
 ++++ Good  
 +++++ Excellent

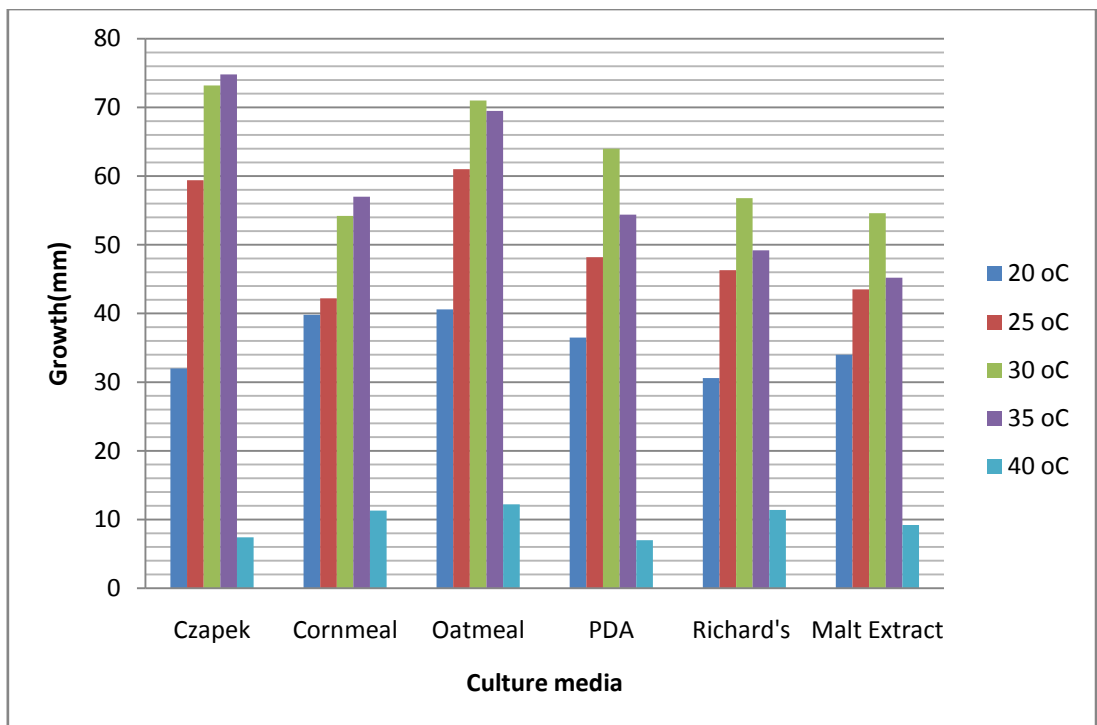
**Fig-1 Growth of *D. maydis* in different culture media**



1. Czapek's dox medium      2. Corn meal agar medium      3. Oat meal agar med  
 4. PDA medium                      5. Richard's medium                      6. Malt extract agar medium



**Fig-2 Growth of *D. maydis* in different culture media**



**Fig-3 Effect of Temperature on growth of *D. maydis***