

## GERMINATION OF *USTILAGO TRITICI* TELIOSPORES ON DIFFERENT SUBSTRATES

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### Abstract

Effect of different culture media on germination of freshly collected spores of *Ustilago tritici* was studied. The germination appears to be erratic and independent of vitamin B complex requirements. Infusate from wheat leaves, a host for *U. tritici*, seems to have a stimulatory effect upon germination of spores of this fungus.

### Introduction

Fischer & Holton (1957) have discussed in detail the germination responses of various species of smut causing fungi. They point out that in many species the spores, when planted on different substrates, react varyingly. Graham (1960) studied germination of lyophilized teliospores of *Ustilago tritici* (Pers.) Rostr. on 27 different agar media. The germination responses appeared erratic. Only pH of the medium, as an independent factor, appeared to have any linear effect on germination of spores. Graham further observed that nitrogenous compounds and malt extract reduced germination of spores. Malt extract either contains, or fosters the derivation of, vitamin B complex moiety. Conversely members of the vitamin B complex are considered essential for the growth of smut fungi on culture media (Fisher & Holton, 1957). This study was undertaken to compare the germination of freshly collected teliospores of *U. tritici* on different media.

### Material and Methods

The different agar media used in this study were (i) Distilled Water agar (ii) Tap Water agar, (iii) Rain water agar, (iv) Glucose agar, (v) Potato-Dextrose-Peptone agar, (vi) Potato-Sucrose-Malt extract agar (vii) Ranker's synthetic medium, (viii) Wheat leaf infusion agar, and (ix) Potato-Dextrose agar. Agar content in all media was uniform at 2% level. The media were prepared according to the procedures given by Rawlins (1933) and were adjusted to pH 5.6.

Freshly collected spores plated on agar media, according to the methods of Loegering, (1941) were incubated at 20°C for 24 hours. There were four replicates of each treatment, from which 1000 spores were counted and percent germination determined. For purposes of statistical analysis the germination percentages were transformed into angles ( $\text{angle} = \arcsin \sqrt{\text{Percentage}}$ ) and the data (Table 1) analysed according to the methods of Snedecor & Cochran (1967).

### Results and Discussion

The results show an erratic pattern of germination. Organic nitrogen reduces and carbohydrates enhance germination (Graham, 1960). In this study,

**TABLE 1. Mean Germination of teliospores of *Ustilago tritici* on different substrates. (Percentage transformed into angles.)**

Media	No. of Spores Counted	No. spores Germinated	Percent Germination	Angle (degrees)
(i) Distilled Water-agar	1,000	214	21.40	27.55
(ii) Tap water-agar	1,000	240	24.00	29.33
(iii) Rain water agar	1,000	316	31.60	34.18
(iv) Glucose agar	1,000	324	32.40	34.69
(v) Potato-Dextrose-Peptide-agar	1,000	329	32.90	35.00
(vi) Potato-Sucrose-Malt extract-agar	1,000	342	34.20	35.79
(vii) Ranker's solution-agar.	1,000	356	35.60	36.63
(viii) Wheat leaf infusion-agar	1,000	528	52.80	46.61
(ix) Potato-Dextrose-agar	1,000	340	34.20	35.76

LSD 1% = 1.27°

however, germination of spores on media containing a nitrogen source (Potato-Dextrose-Peptide and Ranker's Synthetic medium), and those rich in carbohydrates, (glucose agar, Potato Sucrose malt extract and Potato Dextrose agar) was statistically similar (LSD 1% = 1.27).

Relatively more germination on tap water agar as compared with that on distilled water agar medium is probably because of the high carbonate content of the tap water used in the preparation of the medium. Response to malt extract is not evident. Malt extract is a precursor of the vitamin B complex moiety. Since members of the vitamin B complex are considered essential for the growth of smut fungi on culture media (Fisher & Holton, 1957), this antithetic response of the germinating spores of *U. tritici* to malt extract indicates autoauxotrophy, at least during germination, with respect to the vitamin B complex moiety. Graham (1960) also made a similar observation. Blumer & Schopfer cited by Fisher & Holton (1957) observed that the growth of *U. tritici* in artificial culture was autoauxotrophic with respect to aneurin (Thiamine HCl). Even if *U. tritici* is heteroauxotrophic for the members of the vitamin B complex group the results of the present study suggest that nutritional optima during germination may be distinct from those during growth.

Significantly higher germination on wheat leaf infusion agar medium suggests the presence, in the host tissue, of factor (s) having a stimulatory effect on germination of the spores. Graham (1960) observed a definite stimulatory response in germination with 12% sucrose in the medium. Gramineous plant tissues generally are rich in sucrose. Whether this enhanced germination of spores on wheat leaf infusion agar is due to the high sugar content of the leaf alone, or to an interaction of sugar with some other factor (s), present in the tissue, is not known and needs further investigation.

#### References

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