

## A Research Note

### FUNGI IN FOODS

#### V. RESPONSE OF NATURAL POPULATIONS TO INCUBATION TEMPERATURES BETWEEN 12 AND 32 C<sup>1</sup>

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#### ABSTRACT

The effect of incubation temperatures from 12 to 32 C on yeast and mold counts was determined using both antibiotic and acidified media to control bacterial growth. Highest counts were obtained on the antibiotic medium. Lowest counts occurred with both media at 32 C. Little difference in recovery was apparent in the range of 12 to 27 C, with the fungi responding in a similar manner in both media to shifts in incubation temperature.

Earlier reports from this laboratory (3, 4) have pointed out the advantages of an antibiotic bacterial inhibitor in place of acidification for enumeration of yeast and molds in food. Ease of preparation, maximal recovery of fungi, and inhibition of acid-tolerant bacteria are some of the more obvious benefits gained by this substitution.

Since existing recommendations (1, 2) for incubation temperatures are probably based on earlier studies using acidified media (5), it was believed necessary to determine what effect, if any, temperature had on recovery of fungi grown on the antibiotic medium. This was believed especially important in that incubation temperature was observed to have a marked effect on recovery in an earlier study (3). Therefore, the effect of incubation temperature on recovery of fungi from foods was determined over the range of 12 to 32 C using an antibiotic medium in parallel with a standard procedure.

#### MATERIALS AND METHODS

##### *Samples*

All samples were obtained from retail stores in the Gainesville, Florida area. Ten samples were analyzed from each of four food groups, representing frozen seafoods, dairy (mostly cheese), fresh meats, and vegetables.

##### *Preparation of samples*

Fifty-gram samples were blended in 450 ml of buffered dilution water (1) for 2 min. Additional dilutions were prepared by transferring 11 ml into 99 ml dilution blanks as needed. Ten sets of duplicate plates for each dilution were prepared. Five were poured with Potato Dextrose Agar (PDA)

adjusted to pH 3.5  $\pm$  0.1 with sterile 10% tartaric acid and five PDA (pH 7) to which 100 mg/l each of chloramphenicol and chlortetracycline HCl were added after sterilization. A dilution series of each medium was incubated at 12, 17, 22, 27, and 32 C. To ensure maximum outgrowth of organisms, plates at 27 and 32 C were incubated for 5 days, those at 17 and 22 C for 7 days, and those at 12 C for 10 days.

#### RESULTS AND DISCUSSION

The most notable temperature effect observed in this study (Fig. 1) was the pronounced reduction in counts at 32 C as compared to those at the lower temperatures. With the acid medium in particular,

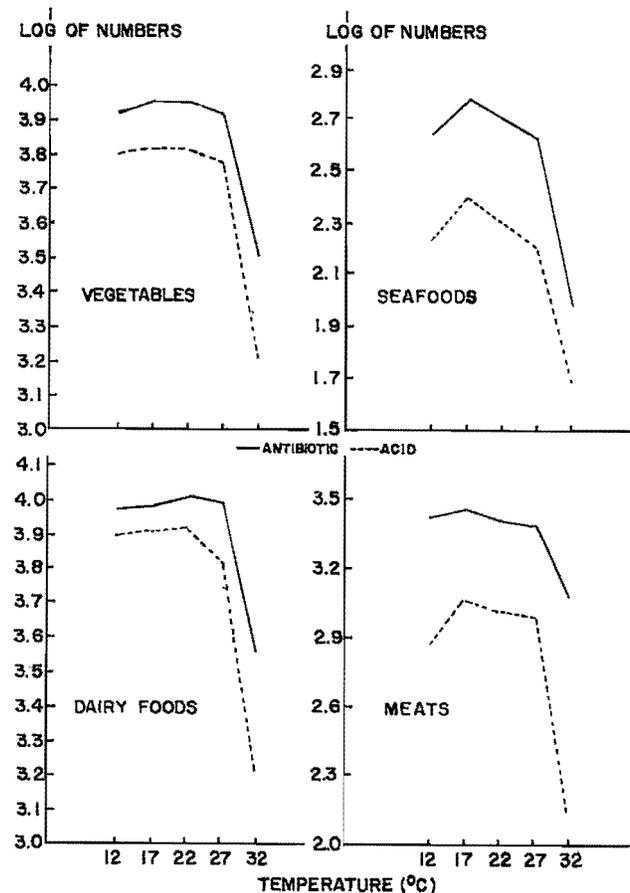


Figure 1. Effect of incubation temperature on recovery of fungi from foods.

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a markedly lower count was observed at the highest temperature of incubation. From these results one immediately questions the value of a "total count" conducted at 32 C when the possibility exists that significant numbers of fungi are present.

Incubation at 12 C also resulted in somewhat lower recoveries as compared to the temperature which yielded the maximum count for each food group. However, as is found with so many food products, counts obtained at a lower temperature may be more informative as to past microbial activity and potential keeping quality than a count obtained at a higher temperature.

The consistency with which the antibiotic medium produced higher counts is apparent with all four groups of foods. Only rarely was a higher yeast and mold count obtained on the acidified medium. In regard to other temperatures, 17, 22, and 27 C, it appears that any incubation temperature within this range would produce about equal counts. It had been hoped that a shorter incubation period at a higher temperature would be possible with the antibiotic medium, however, this was not true. In

fact, responses with the two media were remarkably similar. Although the stress of an acid environment is removed in the antibiotic medium, the flora, either indigenous or developed exhibits maximum growth over a relatively narrow range of temperature. Fortunately the more commonly used temperature of 22 C is within the range of maximum recovery.

#### REFERENCES

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