A Uniform System for Culture Data

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W. C. Richards*・高井省三*: 確認の簡単な培養記録法

To control the interrelated culture data that accumulate during culture studies the establishment of a uniform system whereby the data can be tabulated and oriented with little effort is necessary. If such a system is not introduced initially, the data that accumulate continually become confusing and their interpretation tends to be ambiguous. While culturing a number of the Dutch elm disease fungus, Ceratocystis ulmi, the authors were faced with this problem.

A uniform system designed as a form was then established; it has been used extensively and the problem that occurred previously has been eliminated. Many researchers have experienced this problem and the authors felt that the form should be introduced to others who might find its application helpful in their field of study. This note is a description of the form and how it is used as a uniform system for culture data.

The uniform system shown in Figure 1 is designed as a form, and consists of three vertical columns designated SHAKE, PLATE and TUBE according to our cultural methods. Each column contains six rectangular blocks, each bearing the letters A to L which correspond to those on the legend. Directly below these columns are smaller rectangular blocks in which the fungus strain, the year of culture transfer and the months within each year are entered. The month in which the culture transfers are made is shaded.

Referring to the legend and using the C. ulmi strain (CESS-16-K) the following culture data were tabulated on the form as shown in Figure 1.

PLATE: On 1 June, 1974 three plates were prepared, 20 ml of 3% malt agar being added to each plate. The inoculum source was a plate culture with the transfer date 25 May, 1974. The three cultures prepared were cultured for 5 days. Two cultures were used for experimental purposes and one as an inoculum for shake culturing.

SHAKE: On 6 June, 1974 three flasks were prepared, 25 ml of Wilson modified liquid medium being added to each flask. The inoculum source was a plate culture with the transfer date 1 June, 1974. The three flasks were cultured for 6 days and were used for host inoculation (elm seedling). The incubation period was 8 days. The elm seedling was sampled to reisolate the fungus on plate cultures.

PLATE: On 20 June, 1974 three plates were prepared, 20 ml of 3% malt agar being added to each plate. The inoculum source was the elm seedling previously inoculated with the spore suspension that was derived from a shake culture with the

The three plates were cultured for 5 days. Two plates were discarded and one was used as an inoculum for plate cultures.

**PLATE:** On 25 June, 1974 seven plates were prepared, 20 ml of 3% malt agar being added to each plate. The inoculum source was a plate culture with the transfer

<table>
<thead>
<tr>
<th>SHAKE</th>
<th>PLATE</th>
<th>TUBE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 3 2 0 2 2 2 5 5 3 7 4</td>
<td>5 ✓</td>
<td>5 ✓</td>
</tr>
<tr>
<td>6 3 2 5 2 1 1 6 7 4 6 8</td>
<td>5 ✓</td>
<td>5 ✓</td>
</tr>
<tr>
<td>A B C D E F G H I J</td>
<td>A B C D E F G H</td>
<td>A B C D E F G H I J</td>
</tr>
<tr>
<td>2 0 3 2 0 2 3 6 6 7 4</td>
<td>5 x</td>
<td>5 x</td>
</tr>
<tr>
<td>2 5 7 2 0 2 2 2 0 6 7 4 5 8 1 3 0</td>
<td>5 8 1 3 0</td>
<td>5 8 1 3 0</td>
</tr>
<tr>
<td>A B C D E F G H I J</td>
<td>A B C D E F G H</td>
<td>A B C D E F G H I J</td>
</tr>
<tr>
<td>5 8 1 3 0</td>
<td>5 8 1 3 0</td>
<td></td>
</tr>
<tr>
<td>5 ✓</td>
<td>5 ✓</td>
<td></td>
</tr>
<tr>
<td>A B C D E F G H I J</td>
<td>A B C D E F G H</td>
<td>A B C D E F G H I J</td>
</tr>
<tr>
<td>3 0 3 2 5 1 2 2 5 6 7 4 7 x</td>
<td>3 0 3 1 0 3 2 2 5 6 7 4 1 0</td>
<td>1 0</td>
</tr>
<tr>
<td>7 ✓</td>
<td>7 ✓</td>
<td>1 0</td>
</tr>
<tr>
<td>CESS - 16-K</td>
<td>1 2 3 4 5 6 7 8 9 10 11 12 1974</td>
<td></td>
</tr>
</tbody>
</table>

**LEGEND FOR THE CULTURE DATA TO BE TABULATED ON THE FORM**

- **A** ➞ Transfer of Culture [day]
- **B** ➞ Cultures Prepared [no.]
- **C** ➞ Volume of Culture [ml]
- **D** ➞ Culture Medium
- **E** ➞ Inoculum Source [type]
- **F** ➞ Inoculum Source [day]
- **G** ➞ Inoculum Source [month]
- **H** ➞ Inoculum Source [year]
- **I** ➞ Age of Culture [days]
- **J** ➞ Incubation Period [days]
- **K** ➞ Culturing Period [days]
- **L** ➞ Handling of Culture

- **D** ➞ Wilson modified liquid medium
- **1** ➞ 3% malt agar medium
- **2** ➞ 5% malt agar medium
- **E** ➞ shake culture
- **1** ➞ plate culture
- **3** ➞ elm seedling inoculated with a spore suspension derived from shake culture.

The handling of each culture is shown by symbols:

- ✓ experimental
- x discarded
- ● inoculum for shake cultures
- ○ inoculum for plate cultures
- ▲ inoculum for tube cultures
- ▲ inoculum to host (elm seedling)
- ○ conidiophore formation on wood chips
- ▲ cerato-almin isolation

A culture with no symbol indicates that it is placed in the freezer.

**Figure 1.** The uniform system designed as a form and the method of tabulating culture data.
date 20 June, 1974. The plates were cultured for 5 days. Two plates were used as such, one for tube culturing and the other for shake culturing. The remaining five plates were used for wood-chip application to check the ability of the fungus to produce coremia. After a culturing period of 13 days which resulted in a wood-chip incubation period of 8 days, each of the five plates cultured produced coremia on the wood chips.

TUBE: On 30 June, 1974 three tubes were prepared, 10ml of 5% malt agar being added to each tube. The inoculum source was a plate culture with the transfer date 25 June, 1974. The three tubes were cultured for 10 days and then stored in the freezer as stock cultures.

SHAKE: On 30 June, 1974 three flasks were prepared, 25ml of Wilson modified liquid medium being added to each flask. The inoculum source was a plate culture with the transfer date 25 June, 1974. The three flasks were cultured for 7 days. Two flasks were used for cerato-ulmin isolation\(^1\) and the remaining flask was used as an inoculum for shake cultures.

As shown in Figure 1, the letters K and L are placed only in the top rectangular blocks of each column. It is understood, however, that they apply to each rectangular block. This is because when each type of culture transfer involves the preparation of more than three cultures, a series of rectangular blocks can be combined as shown in Figure 1 to avoid duplication of culture data. A similar arrangement is made for the letters I and J but only in the column marked PLATE.

During any one month of culture transferring, the data to be tabulated should always be entered in the respective rectangular block below the previous entry so that the sequence of transfer can be readily oriented. If an additional form is required during the same month it will serve as an extension to the initial form introduced for that month. It should be emphasized, however, that when cultures are prepared in a new month another form is automatically introduced for that month.

The form is such that it is suitable for purposes other than that described here; it has great versatility because of its uniformity. Attempts have been made to computerize the data tabulated on this form and the results obtained indicate that computerization is feasible.

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