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Parts Per Million

Part I. Definition

Allen Hammer*

The first step in understanding parts per million is to think metric. I can hear the comments already! But the metric system is coming and you will find it is a much easier and a more international measure.

By definition:

1 part per million (ppm) = 1 milligram (mg)/liter (L)

= 0.0001 per cent

Now the question arises, why is 1 mg/L = 1 ppm? With a few more facts, we can easily show why it is true.

Fact 1:

1 mg = 0.001 gram (gm)

or

1000 mg = 1 gram

Fact 2:

1 L = 1000 milliliters (ml)

or

0.001 L = 1 ml

Do you see the relationship?

1000 milligrams = 1 gram

1000 milliliters = 1 liter

Fact 3:

1 ml of water = 1 gram of water

Now let's put the facts together:

(1) given 1 gram = 1000 milligrams

(2) given 1 milliliter of water = 1 gram of water

(3) then 1 milliliter of water = 1000 milligrams

(4) and 1000 milliliters of water = 1,000,000 milligrams

multiply(3) by 1000

(5) given 1000 milliliters = 1 liter

(6) then 1 liter of water = 1,000,000 milligrams

(7) given 1 part per million = 1 milligram/liter

(8) then 1 part per million = 1 milligram/1,000,000 milligrams of water

* Extension Floriculturist, Purdue University
get anyone else." The owner will get what he expects. The owner will receive the same treatment from his employees as he gives his employees.

With unions on the horizon, and the Occupational Safety and Health Act rules being enforced, it is more important than ever to have a stable and happy work force. Remove, "If you don't like it here, leave!" from your vocabulary.

They Said It*

Q. How can floricultural commodities be produced and marketed more efficiently?

A. One major way to increase efficiency is to compartmentalize the labor force and management staff. Many operations have a manager and several other workers who may all be growers, plumbers, electricians, market managers, and floral designers - all in one person. There is no time for any one of them to be a grower or to see that a market is available for their products.

A manager should be the "pencil pusher," figuring the economics of a crop or making a floral arrangement and developing markets. A maintenance man should keep the operation neat and in repair. The grower should spend his time working with the crops; controlling insects and pests, planting, watering, etc. The flower shop's personnel should handle customers and floral design. Producing and selling more and better products need not involve hiring more labor, rather dividing up responsibilities among the present force.

Answers from students paraphrased by Tom Weiler, Assistant Professor of Floriculture, Purdue University to a floriculture exam question.

Import Update*

<table>
<thead>
<tr>
<th>Imports as percent of US Market</th>
<th>1971</th>
<th>1972</th>
<th>1973¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carnations</td>
<td>4.7</td>
<td>7.5</td>
<td>16.4</td>
</tr>
<tr>
<td>Roses</td>
<td>0.25</td>
<td>0.4</td>
<td>1.0</td>
</tr>
<tr>
<td>Mums</td>
<td>7.3</td>
<td>10.4</td>
<td>14.7</td>
</tr>
</tbody>
</table>

¹ Estimated from first 32 week period of 1973

* From "Flower Marketing Information", Sept. 1973
The Penn. St. U., Alvi O. Voigt.

Book Review

Book: Professional Flower Arranging for Beginners

(A 1972 book by Robert L. Gordon of California Polytechnic State University, San Luis Obispo; published by the Vocational Education Productions Department of that university; reviewed by Tom Weiler)

This book, a byproduct of a TV series on floral design, describes residential design of fresh cut flowers, dividing the styles into three:
Continental (Baroque, Rococo, Neoclassic, and Victorian), Japanese (Ikebono, Rikka, Shoka, Nigaire, and Moribana) and Western Line (a fusion of Continental and Japanese design).

There are chapters on materials and techniques for arrangement, flower care, color theory, and flower shows.

Professor Gordon has been aided by Mr. Kirk Kirkpatrick who contributed to the section on Continental design and Mrs. Richard Look who is experienced in Ikebana.

The book is thoroughly and beautifully illustrated. There are several spectacular color photos of arrangements. Beginning designers wishing to augment home interiors with flowers will end the book inspired and informed.

**Capillary Watering of Rieger Begonias**

Allen Hammer

Capillary watering has provided a simple and efficient means of watering potted chrysanthemums (1, 2). It has been suggested as an alternative to overhead watering for Rieger begonias (3, 4). Many of the foliar problems with Rieger begonias can be avoided if the foliage is not wetted (3, 5).

The capillary bench arrangement and details of the system were described in an earlier paper (2). (A copy can be supplied, if requested.)

Ten cultivars of Reiger begonias (Table 1) were potted April 9, 1973 in 5-inch plastic pots using Jiffy Mix to which 5 lbs of 14-14-14 Osmocote/cu. yd. was added. Three plants of each cultivar were hand watered and three capillary watered. All plants were drenched with Dexon-Benlate (8 oz/100 gal) at potting.

Height and fresh and dry weights were recorded June 26, 1973. Table 1 gives the mean for each cultivar and watering method. The two important points shown in Table 1 are: 1) capillary watering produced larger plants in most cases. 2) there is a rather large difference in growth between the cultivars.

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1 Thanks to Mikkelsens, Inc., Ashtabula, Ohio for supplying the plants and Helge R. Wehmeier, Baytex, Inc. New York, N.Y. for supplying the DORIX mat for study.

2 Extension Floriculturist, Purdue University.
Table 1. Height and fresh and dry weights of ten Rieger begonia cultivars hand watered and capillary watered. Mean of three plants.

<table>
<thead>
<tr>
<th>cultivars</th>
<th>hand height (cm)</th>
<th>cap. height (cm)</th>
<th>hand fresh weight (gm)</th>
<th>cap. fresh weight (gm)</th>
<th>hand dry weight (gm)</th>
<th>cap. dry weight (gm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schwabenland Orange</td>
<td>14</td>
<td>24</td>
<td>198.8</td>
<td>395.4</td>
<td>12.5</td>
<td>18.3</td>
</tr>
<tr>
<td>Schwabenland Red</td>
<td>14</td>
<td>22</td>
<td>132.2</td>
<td>332.9</td>
<td>9.1</td>
<td>16.4</td>
</tr>
<tr>
<td>Schwabenfeuer</td>
<td>11</td>
<td>16</td>
<td>117.2</td>
<td>157.8</td>
<td>8.5</td>
<td>9.8</td>
</tr>
<tr>
<td>Goldlachs</td>
<td>12</td>
<td>15</td>
<td>122.4</td>
<td>192.6</td>
<td>8.4</td>
<td>10.8</td>
</tr>
<tr>
<td>Bernsteins Gelbe</td>
<td>14</td>
<td>19</td>
<td>119.6</td>
<td>252.7</td>
<td>8.7</td>
<td>13.4</td>
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<tr>
<td>Crispa</td>
<td>18</td>
<td>22</td>
<td>232.4</td>
<td>344.1</td>
<td>15.9</td>
<td>18.1</td>
</tr>
<tr>
<td>Imp. Sch. Pinc</td>
<td>18</td>
<td>23</td>
<td>276.1</td>
<td>482.1</td>
<td>17.6</td>
<td>31.4</td>
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<tr>
<td>Aphrodite Rose</td>
<td>20</td>
<td>22</td>
<td>256.9</td>
<td>381.7</td>
<td>16.2</td>
<td>26.3</td>
</tr>
<tr>
<td>Aphrodite Cherry Red</td>
<td>18</td>
<td>26</td>
<td>298.6</td>
<td>541.6</td>
<td>21.1</td>
<td>35.0</td>
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<tr>
<td>Krefeld Orange</td>
<td>20</td>
<td>28</td>
<td>306.0</td>
<td>526.7</td>
<td>16.7</td>
<td>30.9</td>
</tr>
</tbody>
</table>

HSD = 4.9 at 5% level of significance
HSD = 136.4 at 5% level of significance
HSD = 7.4 at 5% level of significance

HSD is the number of cm or gm needed for the means to be significantly different.

Capillary watering seems to eliminate some of the problems in the production of Rieger begonias. It not only saves labor, but removes the problem of over- or under-watering of the plants. The foliage remains dry, thus reducing some of the foliar pathogens. Certainly more work needs to be done on fertilizer levels to optimize growth using capillary watering.

Literature Cited

The Way I See It—

Allen Hammer

Congratulations to Jim Mailloux, shop manager and designer at Wright Flowers in West Lafayette, who was named Designer of the Year at the Midwest Trade Fair and Design School at Indianapolis. Jim is a 1972 graduate of Purdue. Word has it, he will enter the FTD Contest in the spring. Good luck, Jim!

Bob Bernacchi spoke at the 6th National Bedding Plant Conference in Columbus, Ohio. He did an excellent job. Can you produce a flat of bedding plants for $1.338?

Several points worth mentioning from the Midwest Trade Fair and Design School are: 1) Small dried star flowers placed in a terrarium can be used as a watering indicator. The star flowers will remain closed as long as enough water is present. When they open, the terrarium should be watered. Be careful, the system will indicate when to water but not how much water. You can still overwater! 2) Carry a few extra roses, carnations, or etc. in your delivery truck and give one to the good neighbor who will deliver the arrangement to your customer who is away. It is much cheaper than making the second trip and provides you with an excellent public relations scheme. 3) Four bottle caps sprayed black and placed on the bottom of an arrangement with a styrofoam base will prevent the styrofoam from marking your customer's table.

Do you sell a cheap product line or an inexpensive product line? An inexpensive pot mum sure sounds better than a cheap pot mum. The little things are important!

We have seen lots of caterpillar damage this summer. Bacillus thuringiensis (DiPel, Biotrol, or Thuricide) gives excellent control. Good spray coverage is extremely important.

Reserve February 24-25, 1974 for a one and a half day conference at Purdue. You will receive more details later.

I will be most happy to hear your comments concerning ppm. It is important that you understand the definition because Part II will build upon it. More Later!

Allen Hammer
Extension Floriculturist

To simplify information, it is sometimes necessary to use trade names of products, equipment and firms. No endorsement of named products is intended nor is criticism implied of similar products which are not mentioned.