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Pear Graders Manual
Michigan State University Cooperative Extension Service
F Folder Series
G.N. Motts, Agricultural Economics; Bureau of Foods and Standards, Michigan Department of Agriculture
Revised September 1956
9 pages

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Pear Grader's Manual

Prepared by
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AGRICULTURAL ECONOMICS DEPARTMENT
in cooperation with
DIVISION OF FOODS AND STANDARDS
MICHIGAN DEPARTMENT OF AGRICULTURE

MICHIGAN STATE UNIVERSITY
COOPERATIVE EXTENSION SERVICE
EAST LANSING
SUGGESTION

For easy reference, fasten this manual to the packinghouse wall.
The purpose of this manual is to summarize the grading provisions of the Michigan regulation dealing with the grading, branding, packing, and sale of pears prepared for market and to provide practical interpretations of the United States grades for pears. The author acknowledges the contributions of Miles Nelson, M. D. Murphy, Don Palmer, and Hunter Hering of the Division of Foods and Standards, Michigan Department of Agriculture.

REGULATION NO. 528 AS AMENDED
(Under provisions of Act 91, P. A. of 1915)

Summary of provisions relating to grading:
All pears, when prepared for market, offered for sale, or sold, must meet the requirements for one of the U. S. grades established for summer and fall pears, August 20, 1955, by the United States Department of Agriculture. Lots of pears not graded to conform with such U. S. grades may be marketed as "Unclassified," provided that not more than 3 percent of such lots are affected by decay and/or an additional 5 percent by serious worm damage. "Unclassified" is not a grade. It is a designation to show that the pears have not been graded in conformance with established U. S. grades.

Provisions of this regulation shall not apply to pears sold directly to a canning or preserving plant or when sold by the grower direct to the consumer.

Copies of the full text of Michigan Regulation No. 528 as Amended, and of the official United States Standards for Pears, may be obtained from the Division of Foods and Standards, Michigan Department of Agriculture, Lansing 13, Michigan.

Packing Requirements
The pears in the shown face must be reasonable samples in size and quality of the contents of the package.

GRADE FACTORS

Variety
Packages of graded pears must contain only one variety.
Summer and fall varieties: Bartlett, Hardy, etc.
Winter varieties: Anjou, Bosc, Comice, Winter Nelis, etc.

Maturity
Graded pears must be mature but not overripe.

Size
The numerical count or minimum size must be indicated on the package. The number of pears in a box must not vary by more than three from the indicated number.

When the numerical count is not shown, the minimum size must be plainly marked on the container in terms of whole inches, whole and half, whole and quarter, and whole and eighth inches, in accordance with the facts. It is suggested that both minimum and maximum sizes be indicated.

Size means the greatest diameter at right angles to a line from the stem to the blossom end.

Handpicked—Clean
All grades must be carefully handpicked and clean.

Miscellaneous
This category includes the following: Black End, Decay, Freezing Injury, Internal Breakdown, Scald, Worm Holes.
None permitted in any grade.

TOLERANCES

Grade
Not over 10 percent of the pears in any container may fail to meet grade requirements, provided:
(1) Not over 5 percent are seriously damaged by insects, and
(2) Not over 1 percent are affected by decay or internal breakdown.

When applied to the combination grade, no part of the tolerance shall be used to reduce the percentage of U. S. No. 1 pears required, but individual
<table>
<thead>
<tr>
<th>Grade Factors (Continued)</th>
<th>U. S. Extra No. 1 (Winter varieties only)</th>
<th>U. S. No. 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SHAPE</strong></td>
<td>May differ slightly from variety if general appearance is not greatly changed.</td>
<td>May differ slightly, but not lessen eye appeal. Winter Nelis may have typical slight denting flattening on one side and/or other slight changes in shape which do not harm appearance.</td>
</tr>
<tr>
<td><strong>HARD END</strong></td>
<td>None permitted.</td>
<td>Summer and fall varieties:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not permitted if pear shows a distinctly end, or unusually smooth rounded base which is unusually dry, tough or woody.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Winter varieties:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not permitted if pear shows unusual yellow base with little or no calyx depression,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>or when outer injury exceeds 3/8 inch in diameter permitted. Much core tissue or brownish discoloration not allowed.</td>
</tr>
<tr>
<td><strong>DROUGHT SPOT</strong></td>
<td>None permitted.</td>
<td></td>
</tr>
<tr>
<td><strong>CORK SPOT</strong></td>
<td>Not permitted if pear shows depressions or other external evidence of the disease.</td>
<td>Summer and fall varieties:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Injury must not affect appearance, eating quality, shipping quality.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Winter varieties:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not permitted if more than one is visible, when outer injury exceeds 3/8 inch diameter.</td>
</tr>
<tr>
<td><strong>RUSSETTING</strong></td>
<td>Russetting not permitted under following circumstances:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>On all varieties, any russetting that shows “frogging” or slight cracking. On Comice, Anjou, and other smooth skinned varieties, slightly rough russetting or thick russetting to a total area of over 1/2 inch in diameter. Smooth, solid russetting to a total of over 1/2 inch diameter and smooth netlike russetting that exceeds 15 percent of surface. On Comice, when smooth, solid or smooth, netlike russetting exceeds 1/2 of surface. In addition, on these and similar varieties, any amount of characteristic smooth russetting on calyx end visible for more than 1/2 inch along contour of pear when calyx is down on a flat surface. On any of the following or similar varieties, rough or thick russetting not permitted when total area exceeds 1/2 inch in diameter. Any amount of characteristic russetting is permitted on the following varieties: Bosc Kieffer, Clairgeau Seckel, Easter Beurre Sheldon, Flemish Beauty Winter Nelis.</td>
<td>Russetting not permitted under following circumstances:</td>
</tr>
<tr>
<td></td>
<td>Summer and fall varieties: On all varieties, russetting which shows “frogging” or slight cracking. On Bartlett and other smooth skinned varieties, slightly rough russetting when total area exceeds 3/4 inch diameter; smooth solid netlike russetting when total area exceeds 15 percent of surface. On Hardy, Sand, and similar varieties, rough or thick russetting when total area exceeds 1/2 inch in diameter. (On these varieties, any amount of characteristic russetting is permitted.) Winter varieties: On all varieties, russetting which shows “frogging” or slight cracking when total area exceeds 1/2 inch diameter. On Anjou and other smooth skinned varieties slightly rough russetting or thick russetting when total area exceeds 3/4 inch in diameter; smooth, solid or netlike russetting when total area exceeds 15 percent of surface. On these and similar varieties, any amount of characteristic smooth russetting on calyx end is permissible when not visible for more than 1/2 inch along contour of pear when calyx is down on a flat surface.</td>
<td></td>
</tr>
</tbody>
</table>
RADES

U. S. No. 2

Not permitted if pear is excessively flattened or elongated, or is constricted or deformed so it will not cut three fairly uniform good quarters, or is so badly misshapen that the appearance is seriously affected.

a distinctly constricted bulge or unusual yellow color at blossom end with little or no calyx depression, or if flesh near calyx body,

unusual yellow color at blossom end, or unusually smooth rounded depression, or if flesh near calyx is unusually dry, tough, or woody.

Not permitted with more than two spots, or when external injury exceeds total of \( \frac{3}{4} \) inch in diameter, or when appearance of flesh is seriously affected by corky tissue or brownish discoloration.

less than total ed. Much corky on not allowed.

\( \frac{1}{2} \) inch diameter.

Summer and fall varieties:
When injury seriously affects appearance, edible or shipping quality.

Winter varieties:
When more than two visible, or when external injury exceeds \( \frac{1}{2} \) inch diameter.

r following cir-

ch shows “frog-

skinned varie-
t when total area
mooth solid or
area exceeds 15

less than total

Summer and fall varieties:
On all varieties, russetting which shows “frogging” or slight cracking when total area exceeds \( \frac{3}{4} \) inch in diameter. Thick russetting on more than 15 percent of surface.

Winter varieties:
On all varieties, russetting which shows “frogging” or slight cracking when total area exceeds \( \frac{3}{4} \) inch in diameter. Thick russetting on more than 15 percent of surface.

On Anjou, smooth, solid or smooth, netlike russetting when total area exceeds \( \frac{3}{4} \) of surface. Any amount of characteristic smooth russetting on calyx end is permissible when not visible for more than \( \frac{1}{2} \) inch along contour of pear when calyx is placed on a flat surface. On Flemish Beauty, smooth russetting permitted on entire surface.
Pears in any container must be tightly packed. All packages must be well filled, but the contents must not show excessive or unnecessary bruising because of overfilled packages.

Pears in bushel baskets must be ring faced.

Not over 5 percent of the pears in any container may fail to meet size requirements, provided that when minimum and maximum sizes are stated, an additional 10 percent shall be allowed for pears that are larger than the stated maximum.

Each container of pears shall be clearly marked with the name of the variety, if known, the minimum size or count, the name and address of the packer, the grade or term “Unclassified,” and the true contents. The same information shall be shown on the invoices or shipping papers accompanying bulk shipments.

Containers of pears marked “Unclassified” must be jumble-packed and not ring faced, and the shown surface must not be of better quality or color or of larger size than the rest of the package or bulk lot.

U. S. GRADES FOR PEARS

<table>
<thead>
<tr>
<th>SUMMER AND WINTER VARIETIES</th>
<th>FALL VARIETIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>U. S. No. 1</td>
<td>U. S. Extra No. 1</td>
</tr>
<tr>
<td>U. S. No. 2</td>
<td>U. S. No. 1</td>
</tr>
<tr>
<td>U. S. Combination</td>
<td>U. S. Combination</td>
</tr>
</tbody>
</table>

A combination of U. S. No. 1 and U. S. No. 2 may be packed. At least 50 percent of the pears in any container must meet U. S. No. 1 requirements.

Not over 5 percent of the containers in any lot may have not more than 10 percent more than the required percentage of U. S. No. 1, provided the entire lot averages the specified percentages.

Individual packages in a lot may vary from the tolerances above, provided the averages for the entire lot are within the specified tolerances.

For packages which contain more than 10 pounds, and when a tolerance of 10 percent or more is provided, individual packages in any lot must have not more than one and one-half times the tolerance specified. For packages which contain more than 10 pounds and when a tolerance of less than 10 percent is provided, individual packages in any lot must have not more than double the tolerance specified, except that at least one pear which is seriously damaged by insects or affected by decay or internal breakdown may be permitted in any package.

For packages which contain 10 pounds or less, individual packages in any lot are not restricted as to the percentage of defects or off-size: Provided, That not more than four times the tolerance specified may be permitted in any package for pears which are seriously damaged by insects or affected by decay or internal breakdown, except that at least one defective pear may be permitted in any package.

Size

Not over 5 percent of the pears in any container may fail to meet standard size requirements, provided that when minimum and maximum sizes are both stated, an additional 10 percent tolerance shall be allowed for pears larger than stated maximum size.

Not over 10 percent of the containers in any lot may fail to meet the packing requirements.

DIAMETERS IN FRACTIONS OF AN INCH FOR MEASURING DEFECTS:

- 3/32"
- 1/8"
- 3/16"
- 3/8"
- 1/2"
- 3/4"
- 1"
<table>
<thead>
<tr>
<th><strong>Limb Rubs</strong></th>
<th>Not permitted if cracked, softened, more than very slightly depressed, dark, or exceeding a total area of 3/4 inch in diameter.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hail Marks</strong></td>
<td>Not permitted if deep or covering a total area of more than 1/4 inch in diameter.</td>
</tr>
<tr>
<td><strong>Sprayburn,</strong></td>
<td>Not permitted if normal color of fruit is materially changed, or skin blistered or cracked, or flesh softened or discolored.</td>
</tr>
<tr>
<td>Sunburn</td>
<td></td>
</tr>
<tr>
<td><strong>Scab, Sooty</strong></td>
<td>No black scab spots with total area more than 1/6 inch in diameter are permitted (except scab spots of russet character, which shall be considered as russetting). Sooty blotch thinly scattered over more than 5 percent of surface, or dark, heavily concentrated spots affecting area more than 3/6 inch in diameter are not permitted.</td>
</tr>
<tr>
<td><strong>Blotch</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Insect</strong></td>
<td>More than 2 healed slight stings, or any stings that greatly affect the general appearance are not allowed. Deep Blister mite or canker worm injury, or injury affecting a total area of more than 1/4 inch is not allowed.</td>
</tr>
<tr>
<td><strong>Injuries</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Bruises</strong></td>
<td>Slight handling and package bruises from good commercial handling in a tight pack shall not be considered damage.</td>
</tr>
<tr>
<td><strong>Broken Skin</strong></td>
<td>Any pear with one skin break larger than 3/16 inch in diameter or depth, or with more than one skin shall be considered damaged and scored against the grade tolerance. Small, inconspicuous skin breaks not be considered damage. In addition, only 15 percent of pears in any container may have more than 0.03 inch in diameter or depth.</td>
</tr>
<tr>
<td>Term</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>varieties</td>
<td>Not permitted if more than slightly cracked, very rough, dark brown or black, or over a total area of ( \frac{3}{4} ) inch in diameter.</td>
</tr>
<tr>
<td>1 or more</td>
<td>Must not mar the fruit or be over ( \frac{3}{4} ) inch in diameter.</td>
</tr>
<tr>
<td>cracked, or</td>
<td>Not permitted if skin is blistered, cracked, or shows any brownish color, if shape is greatly flattened, or if flesh is softened or greatly changed in color (except that sprayburn of russet character shall be considered as russetting).</td>
</tr>
<tr>
<td>except scab</td>
<td>Same as for U. S. No. 1, except that total area must be not more than ( \frac{1}{4} ) inch in diameter.</td>
</tr>
<tr>
<td>concentrated</td>
<td>Same as for U. S. No. 1, except it must total not over 15 percent of surface, or affect area more than ( \frac{3}{4} ) inch in diameter.</td>
</tr>
<tr>
<td>stings,</td>
<td>May not have more than three healed codling moth stings, of which not over two may exceed ( \frac{3}{32} ) inch in diameter or other stings affecting appearance to greater extent.</td>
</tr>
<tr>
<td>extent</td>
<td>May not have blister mite or canker worm injury which greatly deforms or disfigures fruit. Injury may not total more than ( \frac{3}{4} ) inch in diameter.</td>
</tr>
<tr>
<td>shall not</td>
<td>Must be free from bruises that seriously affect the appearance, eating or shipping quality.</td>
</tr>
<tr>
<td>more than one skin break</td>
<td>Have more than one skin break from ( \frac{1}{8} ) to ( \frac{3}{16} ) inch in diameter or depth shall.</td>
</tr>
</tbody>
</table>
OTHER GRADER'S MANUALS

Potatoes ........................................ F-186 Rev.
Apples ........................................... F-199 Rev.
Grapes ........................................... F-200 Rev.
Peaches .......................................... F-201 Rev.
Muskmelons ..................................... F-203 Rev.
Slicing Cucumbers .............................. F-204 Rev.
Tomatoes ........................................ F-205 Rev.