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# Apple Grader's Manual

EXTENSION BULLETIN E-747

*(Replaces Folder F-199)*

FARM SCIENCE SERIES

For easy reference, unfold this manual and fasten to the packinghouse wall.

COOPERATIVE EXTENSION SERVICE  
MICHIGAN STATE UNIVERSITY



(The purpose of this manual is to summarize the grading provisions of the Michigan Apple Marketing Law and to provide practical interpretations of the United States grades for apples. The author acknowledges the assistance of Miles Nelson, M. D. Murphy, Don Palmer, and Hunter Hering of the Division of Foods and Standards, Michigan Department of Agriculture.)

## MICHIGAN APPLE MARKETING LAW (Act 132, P. A. 1937)

### Summary of provisions relating to grading:

**SEC. 1** — The standard apple grades are limited to U. S. grades, and must conform to the latest standards established by the United States Secretary of Agriculture and accepted as the legal standards for Michigan. Apples may not be sold that do not meet the requirements of these grades, except as provided in Section 2 of this act. The Director of Agriculture, however, may establish grades or combination grades; and he may also establish a superior grade to be sold under bond.

**SEC. 2** — Apples which do not conform to the foregoing grades may be sold or shipped as *unclassified*. Such apples must not contain over 20 percent of apples that would conform to any combination of the superior grades. No facing or top dressing shall be permitted; the contents of such packages or bulk-lot containers must not be inferior to the shown surface, and must not contain wormy or decayed fruit.

Any grade of apples not harmful to health may be sold directly to processing or byproduct plants, or sent directly to a packing house to be graded. Apples sold for byproduct purposes shall not again be offered for sale as fresh fruit. Shipments of byproduct apples may be made outside the state only on declaration at destination and with the knowledge and approval of the Director of Agriculture.

Windfalls or drop apples may be packed and sold — if the face is not more than 10 percent of a better quality than the contents and none of the fruit is seriously damaged. Containers must be stenciled "Michigan Drops."

**SEC. 4** — It is unlawful for any person, firm, etc., to pack, store, transport, offer for sale, sell, or otherwise handle apples which do not meet the requirements of the grade.

**SEC. 5** — Containers of apples prepared for market shall be clearly branded or stenciled with the name and address of the party responsible for grading and packing the grade, variety (or marked unknown), minimum size or numerical count, and true net contents.

Bulk shipments shall be accompanied by two cards showing the name and address of the shipper, the grade, name of the loading station, date of loading, and name and address of the consignee, if known.

**SEC. 9** — The provisions of this act do not apply to growers who sell apples produced by themselves directly to consumers.

*Copies of the full text of the Michigan Apple Marketing Law and of the official United States Standards for Apples may be obtained from the Division of Foods and Standards, Michigan Department of Agriculture, Lansing 13, Michigan.*

## U. S. PACKING REQUIREMENTS

Apples tray packed or cell packed in cartons are to be arranged according to approved and recognized methods. Packs must be fairly tight or fairly well filled.

Closed cartons, boxes or baskets containing apples not tray- or cell-packed must be fairly well filled or the pack shall be sufficiently tight to prevent any appreciable movement of the apples.

"Fairly well filled" means that the net weight of apples in containers ranging from 2,100 to 2,900 cubic-inch capacity is not less than 37 pounds for Cortland, Gravenstein, Jonathan, McIntosh and Golden Delicious varieties and not less than 40 pounds for all other varieties.

Each wrapped apple must be completely enclosed by its individual wrapper.

Apples on the shown face of any container shall be reasonably representative in size, color and quality of the contents.

## U. S. MARKING REQUIREMENTS

The numerical count or the minimum diameter of the apples packed in a closed container must be indicated on the container.

When the numerical count is not shown, the minimum diameter shall be plainly stamped, stenciled or otherwise marked on the container in terms of whole inches and not less than eighth inch fractions.

## TOLERANCES

### Grade

Not more than 10 percent of the apples in any lot may fail to meet grade requirements. Not more than half that amount, or 5 percent, is allowed for apples seriously damaged including not more than 1 percent for apples with decay, internal breakdown or both.

When applied to Combination grades, no reduction is allowed for the lot as a whole in the 50 percent of the higher grade apples required in the pack — but individual containers shall have not less than 40 percent of the higher grade.

### Size

Not more than 5 percent of the apples in any lot may fail to meet minimum size requirements; but when a maximum size is stated, an additional 10 percent is allowed for apples larger than the stated maximum.

### Pack

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

## APPLICATION OF TOLERANCES

The contents of individual packages in the lot are subject to the following limitations:

Packages that contain more than 10 pounds cannot have more than one and one-half times specified tolerance when the tolerance for defects is 10 percent or more. When the tolerance for defects is less than 10 percent, double the tolerance is allowed except that one apple with serious damage may be permitted in any package.

In packages that contain 10 pounds or less, not more than 10 percent of the packages may have more than three times the specified tolerance, except one apple with serious damage may be permitted in any package.

## U. S. GRADES FOR APPLES

U. S. Extra Fancy	U. S. No. 1 Early
U. S. Fancy	U. S. Utility
U. S. No. 1	U. S. Hail

## Combination Grades

There are only three combination U. S. grades for apples:

- Combination U. S. Extra Fancy and U. S. Fancy
- Combination U. S. Fancy and U. S. No. 1
- Combination U. S. No. 1 and U. S. Utility

The following abbreviations may be used for U. S. grade names:

- U. S. Ex. Fcy. for U. S. Extra Fancy
- U. S. Fcy for U. S. Fancy
- U. S. Util. for U. S. Utility

Comb. U. S. Fcy. — U. S. No. 1 for Combination U. S. Fancy and U. S. No. 1

Similar abbreviations apply to other combination grades

In all combination grades at least 50 percent of the apples in any lot must meet the requirements of the higher grade in the combination.

*Unclassified* is not a grade, but a term for use as described in Section 2 of Act 132, P. A. 1937, previously cited.



LIMITS OF DEFECTS IN U.S. APPLE GRADES

Grade Factors	U.S. Extra Fancy	U.S. Fancy, U.S. No. 1, U.S. No. 1 Early, U.S. No. 1 Hail	U.S. Utility	
VARIETY	Any package of graded apples must contain only one variety.		Any package of graded apples must contain only one variety.	
MATURITY	All grades except U.S. No. 1 Early must be mature but not overripe. U.S. No. 1 Early need not be mature, but must be not less than 2 inches in diameter.			
HANDPICKED	Apples of all grades except "Michigan Drops" must be carefully handpicked.			
DIRT, SPRAY RESIDUE	Apples of all grades must be clean, except that U.S. Utility must be free from dirt which seriously affects the appearance or the eating or shipping quality.			
SHAPE	.....May be slightly abnormal in shape for the variety but not enough to take away from its appearance.....		Must not be so misshapen that its appearance is seriously affected.	
SIZE	The count or minimum diameter of the apples in a container shall be marked on the container. When the count is not marked, the minimum diameter must be marked on the container. Minimum size is the largest diameter at right angles to a line from the stem to the blossom end sized stem up. Maximum size is the smallest size determined by passing the apple through a round opening in any position.			
Bitterpit, Decay, Internal Breakdown, Internal Browning, Freezing Injury, Jonathan Spot, Scald, Visible Water Core	U.S. Extra Fancy and U.S. Fancy. — After January 31 of the year following the year of production, apples must be free of damage by invisible water core. A specimen would be considered not to be free from invisible water core if an area around the core extending to vascular bundles is affected or if areas around three or more vascular bundles coalesce or if more than a slight amount exists outside the circular area formed by the vascular bundles. See diagrams at bottom of this chart.	None permitted for the grades in these columns.	No decay, internal breakdown, internal browning, freezing injury, or scald is permitted. Visible water core must not be over 1/2 inch in diameter.	
BROKEN SKIN, BRUISES	None permitted except those slight ones which occur during proper handling and packing. No soft bruise permitted, or any other type bruise over 1/8 inch deep or 1/2 inch in diameter.	None permitted except those occurring during proper handling and packing. U.S. Hail: same except that well-healed hail marks where the skin has been broken are permitted, if apples are fairly well formed. No soft bruise permitted, other bruises not over 3/16 inch deep or over 7/8 inch in diameter. Tray or cell packs not over 3/4 inch in diameter.	Must not seriously affect appearance or keeping quality.	
SCAB	None permitted.	Total permitted: 1/4 inch in diameter in the grades in this column.	Total permitted: 3/4 inch in diameter.	
Drought Spots, Scars, Hard Dry Bruises, Hail Marks	No noticeable discoloration other than russetting is permitted. Superficial indentations are permitted. Individual indentations 1/8 inch in diameter or 1/16 inch in depth are permitted, provided skin is not broken.	Permitted if superficial, skin not broken, and total area no more than 1/2 inch in diameter or 1/8 inch in depth.	Total permitted: 1/10 of surface if fruit is not materially disfigured or deformed, except well-healed hail marks totaling 1/2 inch diameter. Unhealed hail marks not permitted.	
LIMB RUBS	Dark brown or black: total of 1/4 inch in diameter permitted. Light brown limb rubs shall be considered as russetting.	Total permitted: 1/2 inch diameter. Light brown limb rubs shall be considered as russetting.	Total permitted: 1/10 of surface.	
CEDAR RUST	Total permitted: 3/16 inch in diameter.	Total permitted: 1/4 inch diameter for the grades in this column.	Total permitted: 3/4 inch in diameter.	
SOOTY BLOTCH, FLY SPECK	If thinly scattered, 5 percent of surface permitted; if dark and concentrated, 1/4 inch in diameter permitted.	If thinly scattered, 1/10 of surface permitted. If dark and concentrated, 1/2 inch in diameter permitted.	1/3 of surface permitted.	
RED SKIN SPOTS	If thinly scattered, 1/10 of surface permitted; if dark and concentrated, 1/4 inch in diameter permitted.	If thinly scattered, 1/10 of surface. If dark and concentrated, 1/2 inch in diameter permitted.	1/3 of surface permitted.	
HEALED INSECT STINGS	Total permitted: 1/8 inch in diameter, including encircling discolored rings.	Total 3/16 of an inch in diameter, including encircling discolored rings.	Total permitted: 1/4 inch in diameter, including encircling discolored rings.	
SAN JOSE SCALE AND SIMILAR TYPES	One scale or mark per apple permitted.	3 marks or scales permitted on green surfaces; 5 marks or scales permitted on red surfaces.	Marks or scales thinly scattered over 1/10 of surface permitted.	
RUSSETING	Any amount permitted in stem cavity or calyx basin which cannot be seen when apple is placed stem or calyx down on flat surface except when rough or barklike when appearance is materially affected. Amounts permitted outside of stem cavity or calyx basin: (1) Smooth, netlike; total 10 percent of area if no very marked contrast with background color; lesser amount if more noticeable. (2) Smooth, solid; total area 5 percent of surface and color show no very marked contrast with background color; lesser amount if more noticeable. (3) Slightly rough; total area 1/2 inch. (4) Rough; 1/4 inch.	<b>U.S. Fancy</b> Any amount permitted in stem cavity or calyx basin which cannot be seen when apple is placed on flat surface, except excessively rough or barklike when appearance is materially affected. Amounts permitted outside cavities: (1) When not excessively rough on Roxbury Russets or similar varieties. (2) Smooth, netlike; total area of 15 percent of surface if no very marked contrast with background color. (3) Smooth, solid; total area 5 percent if pattern and color show no very marked contrast with background; lesser amounts if more noticeable. (4) Slightly rough; total area 1/2 inch. (5) Rough; 1/4 inch diameter.	<b>U.S. No. 1, U.S. Early, U.S. Hail</b> Same as U.S. Fancy except: (1) Smooth, netlike; total area 25 percent of surface. (2) Smooth, solid; total area 10 percent of surface.	Smooth, solid; total: 1/2 surface including any russetting in stem cavity or calyx basin, or slightly rough or excessively rough, or barklike russetting which does not detract from appearance more than the amount of smooth russetting permitted. Any amount permitted on Roxbury Russet and similar varieties.
COLOR	As specified for the variety.	U.S. Fancy and U.S. No. 1: As specified for the variety. No Cooker Grade. U.S. No. 1 Early: No color requirements.	No color requirements.	

Grades of apples with color requirements must have the percentage of color specified for that variety in the table.

For the solid red varieties, the percentage stated means the area of the surface which must be covered with a good shade of solid red, characteristic of the variety. An apple with a lighter shade of solid red or striped red than that considered characteristic of the variety may be admitted to a grade — if it has enough additional area covered so the appearance is as good as that of those apples having the minimum percentage of good red required.

For the striped red varieties, the percentage stated means the area of surface in which the stripes of a good shade of red, characteristic of the variety, shall predominate over stripes of lighter red, green, or yellow. However, an apple with a lighter shade than that considered as a good shade of red may be admitted to a grade — if it has enough area covered to give it as good an appearance as an apple with the minimum percentage of stripes of a good red required.

Color Requirements for Specified Grades of Principal Michigan Apple Varieties

VARIETY	PERCENT OF COLOR		
	U. S. Extra Fancy	U. S. Fancy	U. S. No. 1
<b>SOLID RED OR RED SPOT:</b> Red Delicious, Detroit Red, Gano, King David, Spitzenburg, and similar varieties .....	66%	40%	25%
<b>STRIPED OR PARTIALLY RED:</b> Jonathan .....	66%	33%	25%
McIntosh, Snow (Fameuse), Cortland .....	50%	33%	25%
Baldwin, Ben Davis, Delicious, King, Northern Spy, Stayman, Turley, Wagener, Wealthy, and similar varieties .....	50%	25%	15%
Duchess .....	25%	10%	Tinge
Hubbardston, Stark and similar varieties .....	50%	15%	10%
Williams .....	50%	15%	Tinge
<b>RED-CHEEKED OR BLUSHED:</b> Maiden Blush, Winter Banana and similar varieties .....	Blush Cheek	Tinge	None

GREEN:

Grimes Golden, R.I. Greening, and similar varieties ..... Characteristic ground color

YELLOW:

Golden Delicious ..... 75% characteristic color for U.S. Extra Fancy and U.S. Fancy  
For U.S. No. 1 characteristic ground color

Diameters in fractions of an inch for measuring defect areas:



DAMAGE BY INVISIBLE WATERCORE

Affects: U.S. Extra Fancy and U.S. Fancy grades after Jan. 31, of year following production and affecting U.S. Condition Standards for export anytime.

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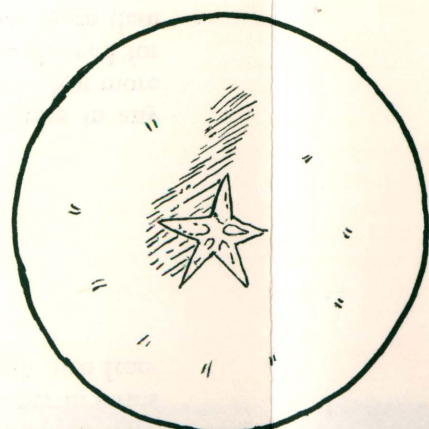
- existing around core and extending to watercore in vascular bundles (see below).

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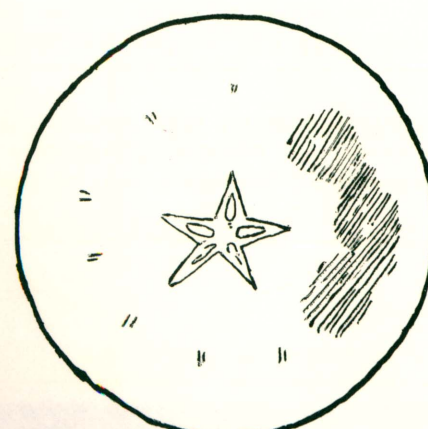
- surrounding vascular bundles when affected areas around three or more bundles meet or coalesce.

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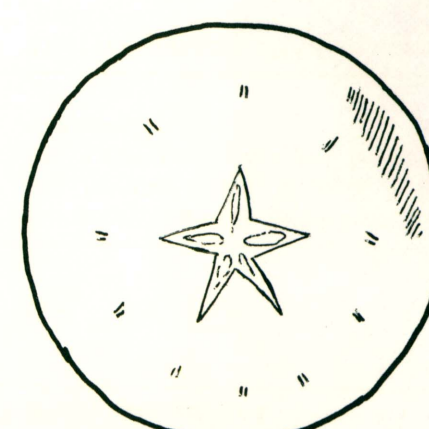
- more than slight degree outside circular area formed by vascular bundles.



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