# THE DEVELOPMENT OF STANDARDS FOR CERTIFICATION OF FIELD CROP SEEDS

THESIS FOR THE DEGREE OF M. S.

Theodore Carroll Maurer

1932

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A Thesis Prepared by

THEODORE CARROLL MAURER

in partial fulfillment

of the requirements for

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## INTRODUCTION

A Crop Improvement, Experiment or Seed Growers Association is a group of the more progressive farmers in a state or territory organized for the production and distribution of pure seed of superior varieties as a fundamental step in promoting the agriculture of their state or territory. The growers efforts are rewarded by increased yields of high quality crops which usually command a premium for seed purposes.

The first association of this kind in the United States was organized by Professor R. A. Moore of the University of Wisconsin in 1901. Since then almost every state in the union has a seed growers organization of one kind or another which may cover the general crops produced in that state, or may be confined exclusively to the principal crop. There are also county or local associations which devote their efforts to a special crop or crops under the direction of the State Association.

## STATEMENT OF PROBLEM

Each state association has certain points of difference and similarity. Since this information has not been available as a whole, it is the purpose of this paper to bring it together at this time for a study of the methods used and standards required by the various State Crop Improvement Associations.

This study of field seed standards is confined almost exclusively to that large grade of seed for general use that is known as Certified Seed. The elite or foundation stock and registered seed grades are omitted except, first, where a difference in requirements may effect the resulting certified seed; second, if the elite or registered grade is widely distributed.

## SMALL GRAINS

### Methods and Standards

In this work the term "methods" will be used to cover the practices or technic of getting information relative to the crop being inspected. The term "standards" covers those qualifications of purity, presence of crop and weed seeds, disease, inert matter, appearance and germination which a crop must meet before it is eligible to carry the state certification tag.

# FOUNDATION STOCK AND VARIETIES ELIGIBLE FOR CERTIFIED SEED PRODUCTION IN VARIOUS STATES

## Nebraska

Fields to be eligible for certification must have been sown with seed which came directly from the Nebraska College of Agriculture or sub-stations thereof, or from similar institutions in other states; or from seed which was certified by a recognized Crop Improvement Association the previous year.

Varieties Eligible

| Wheat | | Oats | Flax | Rye | Barley | Sudan Grass |
|---|---|---|---|---|---|---|
| Winter | Spring | Nebraska 21 | Bison | Rosen | Glabron | |
| Kanred | Cres | Burt 293 | Buda | | Comfort | |
| Nebraska 60 | Marquis | Kanota | N.D.114 | | Spartan | |
| | | | | | Trebi | |
| | | | | | Velvet | |

## Georgia

Certified seed shall be defined as pure seed of recognized varieties that have proven successful in the variety tests of the college and experiment stations and on the farms of the state, not included in the above classification.

## South Dakota

Every field that is eligible for inspection must have been planted with genuine seed of a standard variety. This is certified seed or seed of that class.

Seed grain certification in South Dakota will be done only on wheat, flax, barley and oats. The varieties that will be accepted, with possible exceptions for special or restricted areas, are:

Wheats- Hard Winter: Turkey, Kharkof
Hard Spring: Marqios, Ceres, Reward
Durum : Mindum, Kubanka

Flax- Bison, Buda

Barley- Odessa, Velvet, Glabron, White Smyrna

Oats- Richland, Iogold, Cole, Rainbow, Gopher, Swedish Select

## Virginia

All certified seed must be grown from a preceding generation of registered or certified seed, or from a variety approved by the Board of Reviews, followed by the necessary breeding work as follows:

# VARIETIES WHICH CAN BE REGISTERED OR CERTIFIED

NOTE: Varieties not named may be certified if approved by the Board of Reviews of the Association.

## CORN

Boone County White
Johnson County White
Casey's Purebred
Virginia White Dent
Government No. 182
Silver King
Hickory King
Reid's Yellow Dent
Leaming
Gold Standard
Golden Dent
Cockes Prolific
Virginia Ensilage
Eureka
Bigg's Seven Ear
Wood's Dixie

## WHEAT

V.P.I. No. 131
Fulcaster
Stoner
Mediterranean
V.P.I. No. 112
Leaps Prolific
Fultz (Little Red)
Fultech
Forward

## RYE

Abruzzi
Piedmont Winter

## BARLEY

Arlington Awnless
Union Winter
Tennessee Winter
Wisconsin Winter

## COTTON

Trice
King 29
Cleveland Big Boll

## OATS

V.P.I. No. 1
Virginia Gray Winter
Fulghum
Burt
Lee

## COWPEAS

Whippoorwill
Clay
Iron
New Era
Brabham
Groit

## PEANUTS

Virginia Bunch
Virginia Runner
Spanish
Jumbo

SOYBEANS

Virginia
Mammoth Yellow
Mammoth Brown
Wilson
Hollybrook
Haberlandt
Laredo
Old Dominion
George Washington
Pine Dell

SWEET POTATOES

Big Stem Jersey
Little Stem Jersey
Hayman
Porto Rico
Nancy Hall
Gold Skin
Priestley

IRISH POTATOES

Irish Cobblers
Green Mountain

TOBACCO VARIETIES

| Flue-Cured | Fire-Cured | Air-Cured |
|---|---|---|
| Gold Leaf | Lizard Tail Orinoco | Wildfire Resist- |
| Warne | Blue Pryor | ant Orinoco |
| Cash | Little Orinoco | Little Orinoco |
| Jamaica Wrapper | | |
| White Stem Orinoco | | |
| Wildfire Resistant Orinoco | | |
| Yellow Pryor | | |
| Bonanza | | |

Burley

Judd's Pride Stand Up

## Indiana

"To meet the requirements for certification, the crop, under field inspection must be a standard variety, must show not more than one-half of one percent mixture, no noxious weed, and a minimum of disease."

Varieties of different crops certified not given in "Seed Certification" May 1924.

## Oklahoma

The duties of the certification board shall be to prepare and recommend for the consideration of the directors of the association, the technical regulations and seed standards which concern the production and marketing of seed stocks that may be eligible for registration. This board shall decide whether any variety name recommended for approval shall be made eligible for registration in the crop records of the association. Also, this board shall act upon appeals referred to it from decisions made by the chairman of the association crop committees.

Certified seed is produced from registered seed or from the first year's crop of certified seed on the grower's own farm.

## Varieties Certified

| Cotton | Corn |
|---|---|
| Acala #5 Strain 37 | Midland Yellow Dent |
| Acala #8 | Franklin Yellow Dent |
| Mebane (Cliett) | Oklahoma Silvermine |
| Oklahoma Triumph #44 (C.E.S.32-13-13) | Reid's Yellow Dent |
| Oklahoma Triumph #44 (Briggs 6-4) | Southwestern Yellow Dent |
| | Oklahoma White Wonder |
| Rowden #40 | Pride of Saline |
| Russell | |

Grain Sorghums-

Reeds Blackhull White Kafir (Hydro Strain)

Reed's Blackhull White Kafir (Woodward Strain)

Sunrise Kafir

Bishops Kafir

Chiltex

Dwarf Hegari

Schrock or Sagrain

Darso

Dwarf Yellow Milo

Beaver Milo

Wheatland Milo

California Double Dwarf Milo

Forged and Sweet (Syrup) Sorgas-

Red Top or Sumac (Texas Sub-Station #12 Strain)

Red Top or Sumac (Hayes Experimental Station Strain)

Red Top or Sumac (Hydro Strain)

Atlas Sorgo

Gooseneck

Sudan Grass-

Sudan Grass (Wheeler's Improved)

Broom Corn-

Dwarf Evergreen

Black Spanish

Scarborough Dwarf (Miller #7)

Soy Beans-

Chiquita

Laredo

Dixie

## Kansas

1. A field to be eligible for inspection, must have been sown with seed of a variety recognized by the Kansas State Agricultural College as being well adapted and suitable for growing in Kansas.

2. The following named varieties have been recognized as standard by the college.

(1) a. Hard Red Winter Wheat: Turkey, Kanred, and Blackhull.

(2) Oats: Kanota, Burt and Red Texas.

(3) Sorghums

a. Sudan Grass

b. Sorgos: Kansas Orange, Early Sumac, Sumac, and Red Amber.

c. Grain Sorghums: Blackhull Kafir, Pink Kafir, Sunrise Kafir, Dawn Kafir, Dwarf Yellow Milo, Dwarf White Milo, Feterita, and Freed Sorghum.

(4) Corn:

a. Yellow: Reid, Midland, and Kansas Sunflower.

b. White: Commercial, Freed, Pride of Saline and Boone County.

(5) Sweet Clover: White Flowered Biennial.

(6) Alfalfa: Common and Grimm.

(7) Soybeans: Morse Manchu, Wilson.
Pekin, Sable, Virginia, Midwest and A. K.

(8) Barley: Common Six Row Spring.

(9) Winter Rye

(10) Flax

3. Fields seeded with the above varieties must show evidence of having been planted with pure seed.

4. The following named varieties are eligible for inspection only when planted with certified seed: Kanred, Turkey, Fulcaster, Currell, and Harvest Queen Wheat; Kanota Oats: Blackhull, Pink, Sunrise and Dawn Kafir: Sudan grass, Feterita, and Dwarf Yellow Milo; Kansas Orange, Early Sumac, and Freed Sorgo; Pride of Saline, Colby, Commercial White, Reids, Midland, Kansas Sunflower and Freeds corn; A. K. Morse, Manchu, Wilson, Virginia, and Midwest Soybeans. All other varieties of crops named in Rule 2 will be placed in the above category as soon as there is an adequate supply of certified seed.

5. Fields planted with certified seed from other state organizations similar to the Kansas Crop Improvement Association will be eligible for certification, provided they are of a variety recommended by the Kansas State Agricultural College.

## Michigan

"Only fields coming through channels of regularly inspected seed, from original elite stocks, are eligible for inspection."

Plant Breeders at the Agricultural College are constantly at work selecting and breeding up improved crop varieties. Their work involves the careful study of the characters of thousands of individual plants. The seed of these plants is carefully increased and tested on the College farm, and when seed of strains of promise has been increased sufficiently it is included in varietal tests, not only on the College farm,

but also under field conditions on farms in every section of the state. The particular soil and climatic adaptability of a variety is thus determined.

When a variety has demonstrated its merit through all of these tests, it is ready for release to farmers. The Michigan Agricultural College has adopted the policy of making this release to tried individual growers in quantities sufficiently large so that the resulting crop may be handled with the usual farm equipment and, with reasonable caution, may be kept pure.

This first increase of seed, released by the Michigan Agricultural College for field production, is known by the Michigan Crop Improvement Association as Elite Stock Seed.

## Varieties Certified

| CORN | WHEAT | OATS |
|---|---|---|
| M.A.C. Yellow Dent | Red Rock | Wolverine |
| Duncan Yellow Dent | Berkeley Rock | Worthy |
| Polar Dent | Bald Rock | Iogold |
| Golden Glow | American Banner | Markton |
| Jewetts Yellow Flint | | |
| Clements White Cap | | |

| RYE | BARLEY | BEAN |
|---|---|---|
| Rosen | Wisconsin Pedigreed | Robust (Improved |
| | Spartan | Strain 1922) |

ALFALFA

Hardigan
Grimm

## Minnesota

### Seed Eligible:

The Association will certify only seed stock which traces directly from foundation, registered or certified seed. The seed sown or planted must have been certified seed if the crop produced is eligible for certification. The varieties that are eligible are those recommended by the Minnesota Experiment Station or the Board of Directors of the Minnesota Crop Improvement Association. Exploited varieties and new varieties that have not been tested thoroughly will not be eligible for certification.

### Eligibility of Varieties for Certification:

As stated by most associations a variety to be eligible for certification has to prove itself superior, in desirable characteristics, to the varieties generally used in the state, over a period of years at the State Experimental Station.

A majority of the states allow certification of only three or four varieties of each crop, or where one is outstanding there is no other variety eligible. It is decidedly preferable to have only a few outstanding varieties certified in each state. These varieties become standard for the community and as in the case of Spartan Barley in Michigan command a premium on the market. August 1st. feeding barley 24½¢; #2 barley 32; straight Spartan barley 33. There is a demand for pure varieties

of other grain such as corn, wheat, rye, oats, beans, etc. When a good variety is surpassed by a new one developed at the State Experimental Station, certification of the old one should continue only until a sufficient supply of the new one is produced to take care of the demand. Warning should be given by the Association that certification will be discontinued on the old variety after a certain date. Michigan has an outstanding example in Spartan Barley replacing both Wisconsin Pedigreed and Black Barbless. The Spartan outyields the other two consistently and also has the smooth beards which made the Black Barbless popular even though its color was against it.

In compiling varieties eligible for certification it is noted that the Virginia Crop Improvement Association lists sixteen varieties of corn, ten varieties of Soy beans, nine varieties of wheat, seven varieties of Sweet potatoes, and six varieties of Cow peas. Oklahoma lists seven varieties of cotton, seven varieties of corn, twelve varieties of grain Sorghums and five varieties of Forage and Sweet (Syrup) Sorgos.

Virginia has four major divisions-Coastal, Tidewater, Piedmont and Mountain. Two outstanding varieties of corn for each division with a possible need for one extra early corn in a local area, Burke's Garden and two ensilage corns in demand outside the state should care for all local conditions. Experiment Station results should be the basis of eligibility for certification.

There are times when a variety is produced in one state for the sole purpose of supplying seed to a certain section in another state that has a special use for that particular variety. Under such conditions the production of a number of similar varieties would be advisable. However, actual cases of such conditions are limited and would not justify seventeen varieties of corn or twelve varieties of grain Sorghums.

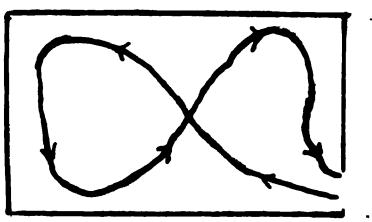
There is a decided need for educational work on outstanding varieties that will prove their superiority when put to the test by thousands of farmers in the state.

The requirements for eligibility of a variety to certification should be subject to the final approval of the Plant Breeding Department of the State College and Experiment Station with a minimum number of years tests and the published results as evidence to support the certification of that variety.

## FIELD INSPECTIONS

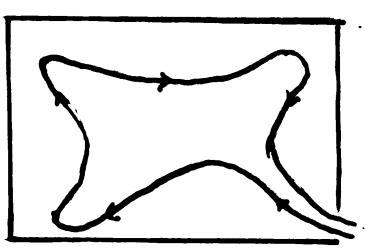
The method of making the field inspection of small grains varies in almost every state. Reports from a majority of those in charge of this work indicates that there is no special plan followed on each and every field. It is left to the judgement of the inspector as to whether he makes ten or twenty counts for varietal mixture and disease. The size and shape of the field and the presence or absence of mixture and disease helps to determine just how the inspector does his work.

Michigan inspectors follow the general plan as shown in the following diagram:



Inspector enters at "A" makes a complete round of the field and out at same point.

Indiana inspectors follow the general plan of a figure eight in the field.



The only complete set of instructions for the inspectors of small grains is that of the Michigan Crop Improvement Association. No doubt other associations follow similar plans although they may not have them in written form.

SUGGESTIONS AND STANDARDS FOR FIELD INSPECTION OF SMALL GRAINS, BEANS, AND CORN IN MICHIGAN.

## I. INSPECTOR'S EQUIPMENT

1. Field inspection book;
2. Several sheets carbon paper;
3. Sharp semi-hard pencil;
4. Railroad guide and auto map;
5. Reference Bulletins and Circulars;
    a. Michigan Weeds, Bulletin #267
    b. Oat Smut and its control, Mich. Ext. Bul. #13
    c. Dependable Michigan Crop Varieties, Bul. #109
    d. Bean Growing in Michigan, Special Bul. #108
    e. Corn Growing in Michigan, Regular Bul. #289
    f. Setting a Standard for Seed, Ext. Bul. #34
    g. Certified Seed Requirements, Mich. Crop.Impr. Ass'n

## II. PROCEDURE

1. Endeavor to follow schedule as closely as possible.
2. Go direct to County Agricultural Agent's office unless instructed otherwise.
3. Inspect all fields accompanied by grower and County Agricultural Agent whenever possible.
4. Observe the general condition of the farm, facilities for cleaning and handling seed, characteristics and attitude of grower and any other factors that may have direct or indirect bearing on certified seed.

5. Upon nearing the field give it a general survey-noting general condition, topography, etc.
6. Before entering the field briefly enumerate for the grower the things to look for and the method of procedure.
7. Start in any corner of the field using the "figure 8" method of inspection as a general guide. In broken and irregular fields use good judgement.

8. Do not rush through the field. Take plenty of time.
9. If mixtures and disease are prevalent jot down counts on pad. (See page 3 for computing per cent of disease and mixture).
10. If only an occasional weed is noticed, pull or cut it. (This does not apply to quack). Set a good example by carrying rogued plants to edge of field.
11. Be ready to identify and answer questions on any weeds and diseases encountered.
12. Write up complete triplicate report on each field inspected.
13. Make note of any testimonial statements that grower or County Agricultural Agent might make about the variety under observation and inspection.

## III. TO DETERMINE AND REPORT PERCENTAGE OF MIXTURE AND DISEASES IN SMALL GRAIN, CORN, AND BEANS

1. Determine the number of individual stems in a pace (pace to mean from back of heel to tip of toe). Make stem counts on at least 10 paces in representative parts of the field and take the average.
2. Jot down the number of stems of mixture and disease found in each of 25 paces or more in representative parts of the field.
3. Determine the average number of stems of mixture and disease per pace and compute percentage according to the following example.

   EXAMPLE: If the number of stems averaged 100 to a pace and the diseased stems averaged 2 to a pace, the percentage of disease would be 2%.
4. In fields where disease and mixture are very prevalent percentage should be determined from counts on at least 50 paces in different parts of the field.
5. The same system of computation must be adopted for all fields inspected during the season, in order to put all inspections on a uniform and equal basis.
6. Percentage of mixture and disease in corn fields is computed on the basis of 100 hills or more.
7. Percentage of mixture in bean fields is determined in the same manner as for corn.
8. Percentage of disease in beans is determined in terms of frequency and dize of affected areas.

IV. TO DETERMINE AND REPORT WEEDS:-

Weed condition is generally reported as:

1. Very weedy
2. Considerable
3. Trace

It is very important to name each weed found in the field, particularly those classified as noxious ("Quack, Canada Thistle, Wild Carrot and Mustard")

V. SEED CROPS AND THEIR MOST SERIOUS WEEDS, CROP MIXTURES AND DISEASES

| Crop | Most Serious Weeds | Most Serious Crop mixture | Most serious Disease |
|---|---|---|---|
| Rye | Cockle, chess, thistle quack, dock. | Other varieties, Wheat | Ergot, stem smut |
| Wheat | " " " | Other varieties Rye | Stinking and loose smut, stem & leaf rust, scab |
| Barley | Quack, dock, thistles, wild buckwheat | Other varieties Oats | Loose smut, barley stripe & leaf & stem rust |
| Oats | Quack, thistles, dock wild buckwheat, mustard | Other varieties barley | Loose smut, stem & leaf rust |
| Corn | Quack, thistles, ragweed and pigweed | Other varieties | Fusarium, root rots, smut |
| Beans | Quack, thistles, foxtail | " " | Blight, anthracnose, mosaic |
| Alfalfa | Quack, catchfly, dock, buckhorn, foxtail | Other varieties sweet, red & alsike clover | Leaf spot, root diseases |

The above classification includes only those weeds, mixtures and diseases of a serious nature. Many others of importance are omitted.

## VI. SMALL GRAIN STANDARDS FOR FIELD INSPECTION

1. Fields must be eligible for inspection.
2. Minimum of noxious and other weeds.
3. Good vigor.
4. Less than 1% disease not controllable by recommended seed treatment.
5. Practically no varietal mixture.
6. Crop grown from treated seed with exception of Berkeley Rock Wheat.
7. Rye at least 40 rods from other fields which might offer source of contamination.
8. Good cultural care.

## VII. BEAN STANDARDS FOR FIELD INSPECTION

1. Fields must be eligible for inspection.
2. Minimum of noxious and other weeds.
3. Good vigor.
4. Less than 1% of disease.
5. Practically no varietal mixture.
6. Good cultural care.

## VIII. CORN STANDARDS FOR FIELD INSPECTION

1. Fields must be eligible for inspection.
2. At least 40 rods from the nearest field of corn which might contaminate it by cross pollination.

3. Minimum of noxious and other weeds.
4. Good vigor, uniformity and variety type.
5. Less than 1% of plants with disease transmissable through the seed.
6. Practically no varietal mixture.
7. Good cultural care.

P. H. Stewart of the Nebraska Crop Growers Association writes as follows:

"I cannot say that our field inspectors follow an exact uniform system in inspecting fields. Fields vary in shape, in conditions, and usually the counts are made more or less at random until the inspector feels that he has a fair average for the entire field. The inspections of the clean seed are made by one person who is trained for this work. Usually we have some of the seniors do this work for the association. The official seed analyst of the state tests these samples for germination."

R. C. Harvey, Field Agent, Virginia Crop Improvement Association writes as follows:

"The field inspectors make the inspections by walking through the field and then around the edges. If the field is a large one, the inspector will follow a wavering line over the field. The counts are made at random. There is no minimum for a given acreage. In making the inspection if no noxious weeds or disease is present, the number of counts is lessened considerably."

Mr. Wm. J. Leary, Office Secretary South Dakota Crop Improvement Association, writes as follows:

"Regarding the system followed in making the field inspection, we go over the field sufficiently so that we can pass on the entire field. Of course you will appreciate that

on some fields it may not need as much coverage as on a more irregular field or one that has some low spots. Should mixtures be found they are estimated on the basis of counts taken at random, with due regard to such areas, being representative and an average is usually given for the acreage."

## Field Inspection Standard for Certified Seed.

### Indiana

"The field shall be visited from all sides and crossed in at least two places. Not less than five representative counts in small grains including four drill rows thirty feet long in widely separated parts of the field shall be made to determine the percent of mixture diseased and weeds. The average of the five counts in each case shall be the basis of judgement for certification, but if one section of a field is found unfit while the bulk of it is good, the unfit portion shall be considered a separate field and excluded from certification. In the case of cross pollinated grains the direction and distance from fields of other varieties of the same grain shall be reported."

The standing grain must show good quality. Must not be badly lodged or rusted.

| | Wheat | Rye | Oats | Soy Beans [5] |
|---|---|---|---|---|
| Loose Smut | 1/2% [1] | 1% [2] | 1/10% | |
| Covered Smut | None | | | |
| Scab | 20% | | | |
| Varietal Mixture | 1/2% | 1/2% [3] | 1/2% [4] | .2% |
| Wt. per Bu. | 57 lbs. | 54 | 31 | |

1. No rye, cockle, cheat, onion or other noxious weeds in either the field or sample.
2. Ergot
3. No wheat, cockle, cheat or onion.
4. No barley, cockle, cheat or onion.
5. Must be 99.8% pure as to variety. May contain not to exceed 2% of cracked, split or weather damaged beans, may contain not more than 1% foreign matter and 1% mottled beans.

## Nebraska

Field Inspection Seed grown in 1931.

Under the Nebraska Certification Law enacted by the 1931 session of the state legislature (House Roll 67), the Nebraska Crop Growers' Association has been delegated as the official organization for small grain, alfalfa and bean certification.

The Certification Committee of the College of Agriculture as provided for by law has drawn up standards and rules for the production and certification of Nebraska state certified small grain which must be enforced by the Nebraska Crop Growers' Association and complied with by cooperating growers of certified seed.

These rules, among other things, provide for field inspections which must be made by an inspector of the Association who has been approved by the certification committee of the Nebraska College of Agriculture. The following standards were set for 1931.

STANDARDS FOR FIELD INSPECTION

Maximum tolerance allowed in small grain field inspections

| | Wheat | Oats | Barley | Rye | Flax |
|---|---|---|---|---|---|
| Loose smut | 1% | 1% [1] | 1% | 1/10% [2] | wilt free |
| Covered smut | 1/10% | | 1/5% | | |
| Other grains | 10 plants per acre | 10 plants per acre | 10 plants per acre | 10 plants per acre | 10 plants per acre |
| Varietal purity | 1/25% | 1/25% | 1/25% | 1/25% | 1/25% |

[1] To include 1% of either or both loose and covered smut in oats.

[2] Ergot-1%- 1 head in 100; 1/5%- 1 head in 500; 1/10%- 1 head in 1000; 1/25%- 1 head in 2500.

The rules for certification also provide for an inspection of representative threshed samples before certification is complete.

## Georgia

Section 5. Small Grain. Wheat, Oats, Barley and Rye. Must be at least 99.5% pure for variety as it grows in the field. Must be free from cheat, cockle and Johnson grass. Must be dry, plump, of good color and weight within two pounds of official standard weight per bushel. Must germinate at least 90%. In the case of rye must be grown at least thirty (30) rods from any other variety of rye. Must contain not more than a trace of mixture of other seeds. Must be inspected in the field after heading and before harvest. Two quarts must be sent to the secretary for analysis and testing.

## Virginia

| | Wheat | Rye | Oats | Barley | corn | Cotton |
|---|---|---|---|---|---|---|
| Loose smut | 1% | | | | | 1% boll<br>10% plant |
| Covered smut | none | | | | | |
| Weeds Cockle & onion | trace | trace | trace | trace | | |
| Varietal mixture | .5% | | | | | |
| Distance from uninspected field | | 250 hds. | | | 250 yds* | 250 yds* |
| ** | | | | | | |
| Other Crop Seed | .1% | .1% | .1% | .1% | | |

* When uninspected fields are on the westward side the distance must be greater.

* Changed from .2% to .1% January 1932.

Minimum Requirements for Registered Seed.

| | Small Grain | Tobacco* | SoyBeans | Cotton |
|---|---|---|---|---|
| Disease | .1% smuts, scab rematode | no mosaic allowed | .1% mosaic | .1% boll rot .1% plant |
| Weeds | Absolutely free | Absolutely free | Absolutely free | |
| Varietal Mixture | .1% | None at all | | |
| Other Crop | Absolutely free | Absolutely free | Absolutely free | |
| Distance from uninspected fields | 500 yards | Each plant covered | | |

* Registered tobacco seed must be produced under paper bags. Place bag over head of each plant before bloom and leave until seed is harvested.

## Minnesota

### Method of Making Field Inspection:

Field inspection shall be made by an authorized inspector who shall carefully inspect the field prior to harvest, crossing the field in diagonal directions at least twice, making at least

ten mathematical determinations as to variety, purity and freedom from diseases. In case of fields showing considerable variation either in the crop itself, other crop plants present, or in the soil, or in fields of exceptionally large acreage, additional inspections are deemed advisable, and their number and location should be left to the discretion of the official inspector.

## Inspector's Report:

The inspector makes a report on the condition of the crop, its purity, freedom from weeds and diseases, the growers equipment for caring for seed and the general condition of the farm. If everything is found satisfactory a final inspection of the threshed grain may be arranged for through the office. In cases where all requirements are not met, the field is rejected for registered or certified seed. The report of the field inspection will be made in duplicate, a copy of which will be issued to the grower.

# STANDARD FOR SEED GRAIN CERTIFICATION- 1932

## NEW YORK SEED IMPROVEMENT COOPERATIVE ASSOCIATION, INC.
Ithaca, New York

A. General suggestions for growing cereal crops for seed:

1. Crops for seed purposes should be grown on fertile, clean well-drained soil so as to insure uniformity of ripening, plumpness and other desirable qualities.

2. A well planned system of crop rotation should be followed so as to maintain soil fertility and to aid in the reduction or control of diseases, weeds and injurious insects.

3. The variety should be adapted to the locality where grown so as to insure maturity at time of harvest.

4. It is recommended that a few members of the Association undertake the growing of "registered-certified" seed of each grain by conducting special seed plots under the supervision of the College of Agriculture. These special sources will enable all seed growers to have access to pure seed as their own stocks approach the lower limits allowed in the standard for varietal mixture.

5. In the case of corn, it is desirable to harvest seed early, sort carefully and dry thoroughly in suitable storage before freezing weather.

6. It is recommended that the grower of seed corn practice careful field selection of seed ears for his own planting. For this purpose, only mature ears from healthy vigorous plants should be saved.

B. Fields* will be eligible to inspection for seed purposes in accordance with the following rules:

1. Only varieties that are recommended by the College of Agriculture and that are eligible to certification under the rules of the Association will be inspected.

*The term "field" as here used applies to the area occupied by one variety of grain which is covered by one inspection report and is undivided by fences, ditches, highways, other crops or natural barriers.

2. In growing crops for seed purposes, not more than one variety of each kind of small grain, e.g., not more than one variety of oats, should be grown on any given farm. Neither should more than one kind of spring grain as oats, barley and spring wheat, nor winter wheat and rye, be grown on the same farm, unless the grower has separate mow and bin storage and special equipment, and will take all necessary precautions to prevent mixtures in storage, threshing and cleaning.

3. A portion of a field will not be accepted for inspection, except that allowance may be made for part of a crop that has been destroyed by any natural cause, or for part of a crop that has been used for other than seed purposes prior to field inspection.

4. A field sown to more than one variety of one grain shall not be accepted for inspection.

5. Corn for seed purposes shall be grown at a distance not less than forty rods from fields of other varieties of corn, except where barriers sufficient to prevent cross-pollination intervene.

6. The growing crop should be free, or practically free, depending on varietal susceptibility, from smut and other diseases which are considered serious. Oats must be treated for loose smut before planting. Growers of wheat and barley seed should secure seed as free from smuts as possible. The approximate amount of loose smut, or covered smut or both, present will be determined at the field inspection.

7. Each grower will be required to give information as to the source of his seed stock and a reasonable guaranty as to its identity.

8. Each grower must own or have access to machinery suitable for properly cleaning all grain offered for sale as seed.

9. Off-types, mixtures of other crops and varieties, together with noxious or otherwise troublesome weeds, should be rogued from the field prior to inspection so far as possible. The inspector will report on all such plants noticed and general condition of the crop and field.

10. As soon as possible after threshing and cleaning, the grower shall send prepaid to the Department of Plant Breeding College of Agriculture, Ithaca, N. Y. a cleaned and graded sample from each field that passed field inspection, or a thoroughly representative composite sample if the crops from two or more fields have been threshed together or stored together.

The size of the samples and the final date prior to which samples should be submitted are indicated in the following table:-

| Kind of Seed | Size of sample | Sample should be sent |
|---|---|---|
| Wheat or rye | ½ peck | Prior to Sept.1st |
| Barley, oats or buckwheat | 1 peck | Prior to Feb. 1st |
| Corn | At least 400 kernels taken 2 kernels from each of 200 ears for germination test | After Jan. 1st but prior to Feb. 15th |

In the case of corn, a two-quart sample of shelled and cleaned grain shall be submitted for purity analysis providing the prior germination test meets the Standard.

Growers are urged to submit samples as far as possible in advance of the dates indicated. No samples will be received for inspection later than March 1st.

The grower shall guarantee in the case of each sample that it is representative of and not better than the entire lot of seed to be offered for sale. The Association reserves the right to make supplementary inspections, at any time, of seed in bins or cribs or wherever stored.

C. Standard for certified and registered-certified Seed Grains.

1. Certified Seed

| | Oats | Barley | Buckwheat | Wheat | Rye | Corn (7*) |
|---|---|---|---|---|---|---|
| Purity (1*) | 99.50% | 98.00% | 99.00% | 99.00% | 99.00% | 99.50% |
| Weed seeds allowed (2*) | .05 | .05 | .10 | .05 | .05 | none |
| Noxious weeds allowed (3*) | None in threshed sample | | | | | |
| Inert Matter allowed: | | | | | | |
| a. Dirt, stones, chaff and other material not seeds | .15 | .15 | .15 | .15 | .15 | .15 |
| b. Sprouted kernels and broken kernels one half size or less (4*) | .20 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| c. Total of a and b | .30 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Seeds of other cultivated plants | .20 | .20 | .20 | .20 | .20 | .05 |
| Germination minimum | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 85.00 (7*) |
| Weight per bushel minimum | 32 lbs | 48 lbs | 48 lbs | 56 lbs | 56 lbs | 56 lbs |
| Mixture of other varieties allowed (5*) | 3.00 | 1.00 | 10.00 | 2.00 | 5.00 | 2.00 |
| Maximum % loose smut, or covered smut, or both allowed | 1.00 | 3.00 (6*) | | 3.00 | | |
| Maximum % ergot | | | | | 3.00 | |
| Registered-Certified seed must conform to the foregoing table except as follows: | | | | | | |
| Weed seeds allowed | .01 | .01 | .05 | .01 | .01 | none |
| Seeds of other cultivated plants | .05 | .05 | .10 | .05 | .05 | none |
| Total weed seeds and seeds of other cultivated plants | .05 | .05 | .10 | .05 | .05 | none |
| Noxious weeds seeds | none allowed in threshed grain | | | | | |
| Mixture of other varieties allowed | .50 | .10 | 2.00 | .50<br>1.00 (8*) | .50 | .50 |
| Maximum % of loose smut, or covered smut, or both, allowed in field | .10 | .10 | | .10 | | |
| Germination minimum | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 | 95.00 |

*For explanation of reference numbers see notes on page 34.

(1) Terms used same as in New York State Seed Law. Purity is the freedom, expressed in percent by weight, from inert matter and from other seeds distinguished by their appearance.

(2) The 0.05% allowance of all weed seeds shall not exceed ten (10) seeds per pound of grain.

(3) The seeds considered as noxious are quack grass, wild mustard, and other related Brassica species, Canada thistle, corn cockle, crab grass, docks and dodder.

(4) The percentage tolerance on broken kernels one-half size or less may be increased at the discretion of the inspecting agency in seasons when such necessity may arise. It is expected that this may apply occasionally to rye, wheat or barley which has been threshed in abnormally dry condition. In no case, however, shall more than double the percent tolerance be allowed.

(5) The percent of varietal mixture will be based on counts of detectable mixture of other varieties and strains both in the field and in the threshed sample. The limit of tolerance specified applies to either inspection.

(6) Applies to Alpha barley only at field inspection.

(7) Seed corn must be free from European corn borer and all other serious pests. The presence of excessive amounts of root, ear and stalk rots, or any other serious disease, may disqualify a field from certification. In making germination rating only strong sprouts will be counted.

(8) Mixture of other varieties in Honor wheat, 1%; in other varieties of wheat, 0.5%.

D. Rules governing sale of inspected seed:

Certified and Registered-Certified seed to be sold as such must conform to the rules of the Association. The certification tag which shall be furnished by the Association shall be attached to all packages containing such seed, and shall have written, stamped or printed on it all items required by the State Seed Law and the Association.

1. The New York State Seed Law requires the following information on the tag:

   a. Commonly accepted name of the seed.
   b. Approximate percentage of purity by weight
   c. Approximate total percentage of weed seeds by weight.

d. Name and number per pound of each kind of seed of noxious weeds, if present singly or collectively, in excess of one seed per 100 grams of grain.

e. Approximate percentage of germination, together with month and year germination test was conducted.

f. Name and address of vendor.

2. In addition to the items required by the State Seed Law, the Association requires the following to appear on the tag:

a. Name of the variety of the seed.

b. Total percentage of inert matter. If any of the inert matter is composed of broken kernels (one-half size or less) and sprouted kernels, the percentage of these may be stated.

c. Percentage of smuts:
Barley- when smuts are in excess of 1 percent.
Oats- when in excess of 0.1%, together with a recommendation that the seed be treated, if not already treated by the seller.
Wheat- (1) When loose smut is in excess of 1%
(2) When covered smut is in excess of 0.1%, together with a recommendation that the seed be treated, if not already treated by the seller.

d. Name or registration number of the grower who, by attaching the certification tag, guarantees to the first buyer that the seed contained in the package actually is the seed which was inspected by the College and found to conform to the foregoing standard, and who further guarantees that any statement appearing on the certification tag properly refers to the particular seed so tagged.

Should proof be presented to the Association by the first buyer that the seed bearing the certification tag is not the seed as represented or that it fails to conform to the Association standard, the grower agrees to make suitable adjustment up to the full extent of the purchase price.

Every effort is made by the College and the Association to examine carefully and report accurately, the inspection findings on all fields and samples of seed, and to inspect only for reliable growers. However, neither the College nor the Association makes any guarantee, express or implied, regarding any lot of seed, and assumes no responsibility in connection therewith, for upon the grower rests the responsibility of delivering seed equal in quality to the inspected samples.

## Montana

Minimum Requirements for Registered #2 (Red Tag)

| | |
|---|---|
| Noxious weed- | Free |
| Other weeds- | 10 per lb. not more than 6 of one kind |
| Other crop seed- | 6 per lb. |
| Germination- | Wheat & flax 90% or better<br>Oats and barley 85% or better |
| Appearance- | In case of wheat it should not contain more than 25% yellow berry. Small shrunken and immatured kernels if present in appreciable quantities will lower the grade to #2.<br><br>A reasonable amount of shrunken, discolored kernels & 50% yellow berry will be permitted under this grade. |
| Broken Seed- | 8% |

## Minnesota

A- The Requirements for Wheat, Oats, Barley, Rye and Flax:

1. The crop must show good vigor, relative freedom from diseases and weeds, and from mixtures of an occasional plant of other crop varieties.

2. The seed must be free of (no tolerance) Quack Grass, Canada Thistle, Perennial Sow Thistle, Dodder, False Flax,

and contain not more than one * seed of the other weed seeds per pound after cleaned for sale. No tolerance will be permitted.

3. Only a trace of chaff, broken seed and foreign matter can be permitted.

4. Not more than a trace of weathered, scabby or otherwise diseased seeds can be allowed.

*This may vary with the season.

B- The Requirements for Corn:

1. The crop must be grown at least 40 rods from any other variety or otherwise isolated to prevent cross pollination.

2. Field inspection should be made previous to the selection of the seed crop.

3. The plants growing in the field must give evidence of 99.99% or more purity.

4. The ears must indicate soundness, maturity and freedom from mixtures.

C- The Requirements for Soybeans, Field Peas and Beans.

1. The field must be at least 40 rods distant from any other field of the same variety.

2. The seed must be 99.99% or more when prepared for sale.

3. The crop must be practically free from disease in both field and bin.

It is evident from the field inspection standards as given for the various associations that there are rather wide limits of tolerance both as to disease, weeds, and crop or varietal mixtures and judgement of the inspectors. This may not be particularly serious in some instances, but it has been the consensus of opinion among those attending the International Crop Improvement Association meeting at Chicago each year that a uniform set of standards should be adopted. This has not been done to date chiefly through lack of agreement on details.

The actual field inspection is taken seriously by some states while others seem to think it is not of sufficient importance to warrant the expense entailed. The majority favor a rigid field inspection. They have not agreed entirely on the matter of technic but the inspection is thorough and gives them a basis on which to judge the grower, his soil conditions, equipment for handling and mental attitude toward the work. One certified seed grower in a community can put certified seed in ill-repute if allowed to raise a crop of certified seed that has a very poor appearance in the field. Regardless of the quality of the cleaned seed, his neighbors will remember the field and mention it at every opportunity when certified seed is under discussion.

The field inspection is of first importance from an educational standpoint. The inspectors who makes his counts on disease and mixtures, writes up his report and leaves has missed an excellent opportunity to make a better seed grower. The inspector might also have learned something of value from the grower.

The field inspection report when made out properly is a guide to all other inspections. When the field inspection report shows mixture, weeds or disease, the person handling the bin sample has a guide to help him make a more efficient test of the threshed grain.

There is no doubt at all that a "trace" may be defined at two rather extreme degrees by two inspectors working in adjoining or widely separated states. There are many points in the actual field inspection that are rather vaguely defined. However, it is not possible to set a standard that will leave no question as to what is meant. The farmer is the man who buys the certified seed eventually. What term would express to him the amount of disease, weeds or mixture present in a field? Percentage may express it in one section, while plants per square rod or acre may be more descriptive in another. Any definite term even though used sectionally would be much better than a widely varying indefinite term.

It is possible that a sectional inspection system may be worked out that will be much more satisfactory than the present lack of uniformity in covering the field. A system that will be unanimously accepted and practiced so that seed going from one state to another will not vary in quality to the detriment of certified seed as a whole is badly needed. There are many other things that effect the quality of the cleaned and graded certified seed, but the field inspection is a common denominator and should be equal in all cases.

## Bin or Sample Inspection Methods Standards

After the field inspection reports have been graded into classes, passed and rejected, those passing have still another inspection to undergo. The sample or threshed grain inspection.

A survey of the requirements of the different state organizations show considerable variation on their methods of handling and standards for this sample inspection work.

| State | Size Sample | Condition |
|---|---|---|
| Indiana | 2 qts. each field | Cleaned as for sale |
| Nebraska | Not defined | Cleaned as for sale |
| Georgia | 2 qts. | Not stated |
| So. Dakota | 1 peck | Cleaned accompanied by guarantee of grower that it is representative of seed for sale. |
| Virginia | 1 peck small grain<br>10 ears corn<br>½oz. tobacco | Uncleaned-to determine if grower is justified in cleaning and having bin inspection which is required if seed is to be sold. |
| Utah | 1 qt. small grain<br>8 oz. Alfalfa<br>2 oz. Onion | Representative sample for test before sealing. Final sample taken by representative State Board of Agriculture, or under his supervision. |
| Kansas | Not given for corn | Representative of stock for sale. Taken by inspector when examined in crib. |

| State | Size Sample | Condition |
|---|---|---|
| Minnesota | Small grain 1 qt. | Cleaned-grower must clean at least 5 bu. and select quart from this seed cleaned as representing the total crop. |
| Idaho | 1 peck | Cleaned ready for sale. |
| Michigan | 1 peck | Preliminary as it comes from thresher final taken at time of bin inspection by Association inspector. |
| Canadian seed Growers Assn. | Not given | Sample not required except when sample is to be certified as free from stated impurity after examination of threshed sample |
| Oklahoma | Varies with kind of crop. 4 lbs. generally. | Representative of all grower expects to sell. |
| Montana | 1 peck | Cleaned as it will be offered for sale. |

REQUIREMENTS FOR GRADED CERTIFIED

Seed.

Small Grain

| | Purity | Varietal Mixture | Weed seed | Other crop seed | Inert matter | Germination | Sold in sealed bags | Test made |
|---|---|---|---|---|---|---|---|---|
| Kansas | Prob. 99.50 or better | | .2% | .2% | Not definite | 95 or more depending on seasonal condition. 90 or more alfalfa and sweet clover. Less looked on with disfavor. | | State Laboratory |
| Oklahoma | In process of revision | | | | | | Optional may be required special crops | |
| Idaho | 99% | | | 2 seeds per lb. | | | Yes compulsory | State Seed Comm office |

| | Purity | Varietal mixture | Weed seed | Other crop seed | Inert matter | Germination | Sold in sealed bags | Test made |
|---|---|---|---|---|---|---|---|---|
| Minnesota | | 8 or 9 per lb. | 1 per lb. not noxious | | Trace | 90 or better seasonal | | State Laboratory |
| Utah | 99% | | One of noxious | | | Broken seed 1% wheat .2% oats 2% barley | Compulsory by Rep. State Board Agr. | |
| Virginia | 99% Rye 98% | | 2 onion .1% Pulb. 1 cockle Pulb. | | | 90% or better | | |
| South Dakota | No definite standards given in material submitted | | | | | | | |
| Montana | | | | 6 per lb. | | Wheat & flax 90% or better. Oats & barley 85% or better. Broken seed 8%. | | |

| | Purity | Varietal Mixture | Weed seed | Other crop seed | Inert matter | Germination | Sold in sealed bags | Test made |
|---|---|---|---|---|---|---|---|---|
| Nebraska | 99.70 .3% | (includes other crop seed, weed seed, inert matter) | Noxious none other 10 per lb. | | | | | State seed analysis makes germination test |
| Indiana | 99.50% | .5 | No rye cockle, cheat, onion or other noxious weeds | | | 90% or better** when made | | Seed Cert. Committee |
| Georgia | 99.50% | | Free from cheat, cockle Johnson grain | | Trace | 90% | | Rep. Crop Imp. Assn. |
| Michigan | 99.00% | 20 per lb. max. | 5 per lb. | | 5 per ½ of 1% lb. | 90% or better | No | Crop Imp. Assn. |

** No germination tests made on winter wheat, rye and barley
*This may vary with season
maximum allowance other weeds 10 per lb.

The field inspection methods and standards show considerable variation so far as the actual specified details are concerned. However, there seems to be a uniformity in ideals among the leaders of Crop Improvement Associations that more than makes up for the lack of written rules. Although there is a possibility that the lack of definite standards for field inspection covering the presence of common weeds, disease and crop mixtures may allow a crop to pass in the field, the sample or bin inspection will usually show the presence of each one or all so the crop may be rejected if it does not conform to the threshed grain standards.

In practically every associations field inspection report there is a place for noting mixture, disease and weeds. It is evident that some system is used to determine the amount of each present.

It is possible that too few counts or estimates could be made, but the trained inspector knows when a field approaches the maximum limits and makes additional counts to verify his judgement.

The presence of weeds is considered from the standpoint of effect on appearance of the field and the ease with which the seeds can be cleaned out of the grain crop. Appearance of the field could be very poor and yet the cleaned seed of high quality. However, the crop of certified seed coming from such a field does not encourage the use of certified seed in the growers community. The growers neighbors are skeptical of new practices or varieties and will base their judgement of the

crop to a large extent on the appearance of the field. The inspector without any specific regulations faces a difficult task but the results accomplished have been far-reaching in the improvement of crop yields. There is a possibility that more rigid exact field standards would not tend to raise the quality of certified seed any higher than the present methods and standards.

The only possibility that more exact rigid methods and standards would be necessary might be the passing of control from the present well qualified leaders to less experienced officials who are not familiar with the fundamental purposes of seed certification.

The bin or sample inspection methods and standards vary from state to state and in fact within the state depending on conditions and the kind of crop. Except under special conditions the grower can generally be relied upon to submit a sample as required by each association. In the case of new growers the officials should and do keep a closer check on the sample submitted to see that it checks with the field inspection report and the seed as it is actually shipped. There are possible conditions where errors or intentional misrepresentation occurs and the officials should be on their guard to prevent such occurrences. Many of these errors are being eliminated by requiring each grower to limit his production to one variety of each kind of field crop. Mixtures of varieties happen frequently enough from farm to farm by means of drills and threshers without taking additional chances by growing them on the same farm.

## WORK OF THE INTERNATIONAL CROP IMPROVEMENT ASSOCIATION

The International Crop Improvement Association came into being as a result of meetings held informally during the International Livestock Show at Chicago in 1918. The actual organization took place in 1920.

The mutual interest among Extension Agronomists, is seed certification which was the chief reason for organizing the International Crop Improvement Association. Evidently when two or three Extension Agronomists gathered in one place a discussion started which ended in warm argument as to the merits of conducting certification work in their respective states. The International Association was to provide an opportunity to meet, discuss and standardize practices among the State Association.

Committees appointed by the President also reported on Corn and Soy Bean Standards.

### CEREAL AND SMALL GRAINS

(Adopted November 29, 1921)

1. The International Crop Improvement Association shall direct its efforts towards the solution of the following problems:

A. To consolidate and co-ordinate the efforts of the various State Organizations.

B. To encourage uniform standards of purity, viability and quality in the different classes of seed recognized.

2. That the above classes and grades of seed be defined as follows:

A. By the term "Elite Stock Seed" is meant a pure stock of seed originating directly from a single plant, the progeny of which has been proven in plot of field test and has shown itself to be worthy of distribution, or a stock of seed not necessarily genetically pure, but which has proven itself worthy of special recognition after proper plot or field trials have been conducted. This applies to that class of plants which naturally cross-pollinate.

B. By the term "Registered Seed" is meant seed that is of an approved and known variety which has been inspected in the field before harvest by an expert (see appendix for definition of "expert") and reported on favorably by him as regards the purity of variety, vigor and freedom from disease; which germinated up to the standard indicated below; which is sound, plump and of good quality and color; which on bin or sack inspection is found to be free (for definition, see appendix, article 2 ) from seeds of other cultivated plants and all other weed seeds; which is well cleaned and graded; which weighs not less than two pounds less than the standard Elite Stock Seed or from preceding generation of Registered Seed and which finally has been duly registered under a definite certificate number.

(1) All seed of this class must bear the registration tag and number of the association

issuing the certificate or keeping the record. The question of sealing the bags containing registered seed shall be left optional with the certifying organization.

(2) The standard required by registered seed in the case of plants which normally self-fertilize, such as Wheat, Oats, Peas, Beans, Soy Beans, Vetches and Buckwheat, shall be genetically pure or practically pure, that is, free from other strains as well as varieties and shall be capable of germinating at least 90%.

(3) That certified seed be defined as seed of special merit, but which is not fully up to the standard required by registered seed. This class of seed in the case of self-fertilizing plants such as Wheat, Oats and Barley shall be at least 99.5% pure as to variety and shall not contain more than thirty-five kernels of other grains per pound; shall be well cleaned and graded; shall be free from seeds of weeds classed as "noxious" in the appendix of weeds of other plants considered harmful or useless; shall be sound and of reasonably good color; shall weigh not less than two pounds less than the standard weight of the standard bushel for grain of the kind and shall be capable of germinating at least 95%.

(4) Board of Review. That a committee consisting of each member organization of the International Crop

Improvement Association to be appointed by the respective organizations, meet at the time of the International Grain and Hay Show, to pass upon samples of the Registered and Certified seed brought by representatives of the different State Associations, said samples to be representative of the highest and lowest qualities passed for certification. In this way, the committee is of the opinion that the question of standards and grades would gradually come to be solved more satisfactorily.

APPENDIX

1. The species of farm weeds which shall be included within the meaning of the term "Noxious Weeds" as used in connection with the meaning of the regulations of this Association shall be as follows:

Wild Oats (Avena Fatua L.)

Twitch or Quack Grass (Agropyron repens (L) Beauv)

Docks (Rumex L. and Rumex obtusifolius L)

Russian Thistle (Salsola Kali L. Var. Tenuifolia G. F. W. Mey)

Purple Cockle (Agrostemma Githago L)

Campions including White Cockle (Lychnis Alba Mill. Night Flowering) Catchfly (Silene Noctiflora L) and Bladder Campion (Silene latifolia(Mill.) Britten and Rendle

Sow Cockle (Saponaria vaccaria L)

Stinkweed (Thaspi arvense L)

False Flax (Camelina species)

Ball Mustard (Neslia Paniculata (L) Desv)

Wild Radish (Raphanus raphanistrum L)

Wild Mustard (Brassica arvensis (L) ktze) and other wild Brassica species)

Hare's Ear-Mustard (Conringia orientalis (L) Dumont)

Tumbling Mustard (Sisymbrium altissimum L)

Wild Carrot (Daucus carota L)

Field Bindweed(Convolvulus arvensis L)

Dodder(Cuscuta species)in alfalfa seed

Blue Bur of Stickweed (Lappula echinata Gilbert)

Blue Weed (Echium vulgare L)

Ragweed (Ambrosia species)

Ox-Eye Daisy(Chrysanthemum leucanthemum L)
Canada Thistle (Cirsium arvense (L) Scop.)
Perennial Sow Thistle (Sonchus arvensis L)
Ribgrass (Plantago lanceolata L)

2. The margin of tolerance allowed within the meaning of "Free". The maximum number of seeds of noxious weeds that may be tolerated in any seeds without affecting their standing as being free from the seeds of the said weeds within the meaning of the term "Free", shall be as follows:

a. For seeds of Oats, Barley, Wheat, Rye, Buckwheat, Mangels or Beets and other seed approximately similar in size, one weed seed in one pound avoirdupois.

b. For seeds of Flax, Millet or other seed approximately similar in size, one weed seed in one pound avoirdupois.

c. For seeds of Sweet Clover, White Clover, Crimson Clover and grasses, five weed seeds in one ounce avoirdupois.

3. By the term "Expert" as used in connection with these regulations is meant an individual whose primary work is with crops or whose training is considered by the proper authorities of the State or County to be such as to make him capable of performing the work satisfactorily.

## * Soy Beans

1. There shall be three classes of seed receive official recognition, as follows:
    1. Elite Seed
    2. Registered Seed
    3. Certified Seed
2. Elite seed shall be seed of a genetically pure stock, originating directly from a single plant, the progeny of which has demonstrated its merits in plot and field trials. Seed can only be classed as Elite when under the direct control of the originator or breeder.
    1. Standards of Quality: Elite seed to comply with standards of quality must be pure, contain not to exceed 2% of cracked, split or weathered beans, no weeds or foreign matter, and must germinate 95%.
3. Registered Seed shall be defined as the progeny of Elite seed when such seed is free from mixtures of other varieties.
    1. Standards of Quality: Registered seed must be genetically pure for the variety, may contain not to exceed 2% weather damaged, cracked or split beans, not more than ½ of 1% weed seeds and other inert matter, and must germinate at least 90%.
4. Certified Seed shall be defined as seed of known improved variety, but not up to the standard required of Registered seed.
    1. Standard of quality: Certified seed must be

99.8% pure as to variety , may contain not to exceed 2% of cracked, split, or weather damaged beans, may contain not more than 1% foreign matter and 1% mottled beans, and must germinate at least 90%.

## Corn

(Adopted December 3, 1923)

Three classes of seed corn shall be established, namely: Elite, Registered and Certified. These are defined as follows:

### Elite Seed

Elite stock seed shall be defined as- seed produced by special methods of breeding or selection and which has demonstrated its suitability for propagation on the basis of field trials conducted to the satisfaction of the state association and state experiment station. Elite seed shall be designated as such only when under the direct control of the originator.

### Registered Seed.

Registered seed shall be defined as - the progeny of Elite stock seed when such seed is free from mixtures of other varieties, is of good quality and germinates at least 95%.

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*The above standards for Soy Beans were proposed by a special committee at the annual meeting, December 3, 1923. After

considerable discussion as to whether or not mottled soy beans constituted an impurity, the matter was referred to a special soy bean meeting held December 5 of that same year. No record of the decision reached at this meeting is available.- H.C.R.

Note: The margin of tolerance allowed within the meaning of the word "Pure" under standards for registered seed is not to exceed one impure seed in an average two-pound sample.

Corn which is eligible to be certified "must be a variety recognized by the inspecting organization and approved by the State Experiment Station."

## QUALIFICATIONS

To qualify in any one of the three classes, the seed stocks must comply with the State seed laws and the following requirements made by the inspecting organization:

1. Freedom of Mixture.

   Elite and registered seed corn shall be grown not less than 40 rods from any other corn field and shall be practically free from admixture of similar or widely different varieties. Certified seed shall be grown not less than 40 rods from fields of different varieties and shall not average more than one kernel per ear of evident mixture.

2. Germination.

   The germination shall be not less than 95% of vigorous plants free from disease.

3. Quality.

The seed shall be bright in appearance. When shelled, the seed shall be reasonably uniform in size with not more than a trace of tip or butt kernels.

4. Moisture Tests.

Inspecting organizations may require moisture tests if thought necessary.

5. Standard of Representative Sample.

The inspector and owners at the time of the seed house inspection shall agree on a sample of not less than five years, representative of the corn offered for sale. These ears shall be placed on file in the office of the inspecting organization.

6. Inspection.

Field and seed house inspection by a representative of the inspecting organization is necessary to certification.

a. Field inspection.

(1) Time-When the ears are well dented

(2) Points to be considered or observed in field inspection.

(a) Distance of field from other corn fields

(b) Evident admixture of other varieties

(c) Maturity, proper development and adaption to locality and uniformity of ripening.

(d) Vigor of plants

(e) Lodging, broken stalks, freedom from insect injury and disease, such as smuts and rots of corn.

(f) General uniformity, height of stalk, height of ears on stalk, length of shank, covering the ear.

b. Seed house inspection.

(1) Time- not before January 1st.

(2) Storage.

(a) Place

(b) Method of drying and storing.

(3) Purity. Admixture of kernels of different types or colors shall be determined by examining one hundred representative ears. There shall not be, on the average, more than one kernel per ear of evident mixture. Shade of color shall not be considered.

(4) Germination

(a) A minimum of two representative kernels from each of 100 representative ears shall be taken for the germination test.

(b) The germination test shall be made according to recognized methods and under the direction of the inspecting organization.

(c) Vigor and freedom from disease should be considered.

(5) Moisture tests may be required if the inspecting organization deems it desirable.

(6) The inspector shall take not less than five ears, agreed upon by the owner and inspector, as representative of the corn to be offered for sale.

In 1928 at the Annual Meeting, J. C. Hackleman, Chairman of the Nomenclature and Standards Committee reported as follows:

Your committee on Nomenclature and Standards, working jointly with a committee on Terminology of Seed of Improved Varieties, representing the American Society of Agronomy, has continued its work for another year. After conferences with members of the committee representing the Society of Agronomy, and suggestions and reports from various representatives of the International Crop Improvement Association, your committee desires to make the following report:

We are recommending three general classes of seed, which classification can be applied to alfalfa, corn, clovers, cotton, sorghums, small grains, soy beans and tobacco. We are recommending one departure from the present accepted terminology. In accordance with the report of the American Society of Agronomy and the opinion expressed by representatives of the International Crop Improvement Association at their meeting in 1928 and later in letters from various members, it is agreed that the term, "elite", does not carry with it the full significance of that type of seed. It was felt that another term which would be more easily understood and would have more significance would be found. The term agreed upon is "foundation seed stock". The two main classes of seed which will be recognized in commerce are: registered and certified. Your committee desires to submit the definitions of these terms in exactly the same phraseology as submitted to and approved by the American Society of Agronomy.

## FOUNDATION SEED STOCK

Foundation seed stock constitutes the traceable progeny of a variety of strain produced by individual plant, head, of pad selection, or mass selection of plants, heads, or pods, or by controlled self-pollination and cross-pollination followed by selection, of recorded origin, in the hands of the original breeder or experiment station, or their legal successors.

Foundation seed stock must be in the hands and under the direct control of the original breeder, or a delegated representative of a State Seed Improvement Association, or State or Federal Agricultural Experiment Station.

By direct control is meant that the seed must be grown on land owned or operated directly by the originators of the variety or strain whether individual farmer, seedsman, or station or a delegated successor.

## REGISTERED SEED

Registered seed shall be defined as seed of a variety or strain which is the multiplied progeny of foundation stock seed. Such seed will be standardized in accordance with standards of purity and quality laid down by the State Seed Improvement Association, Agricultural Extension Service, and State or Federal Agricultural Experiment Station.

## CERTIFIED SEED

Certified seed shall be defined as seed of a variety or strain approved by the State or Federal Agricultural Experiment Station, certified as to the purity, quality and suitability in accordance with the standards laid down by the State Seed Improvement Association, Agricultural Experiment Station and Agricultural Extension Service.

It will at once be apparent that the committee is recommending a term which is now used to apply to a variety of crop. The term registered is here referred to. The committee feels, however, that there are at least two very good reasons for using this term to apply also to a class of seed. First: The International Crop Improvement Association adopted it a number of years ago, with the result that its usage is now pretty well understood by farmers and seedsmen. Second: It seems to carry a peculiar connotation of meaning, indicating as it does a superiority in purity and quality due to breeding and selection which lends value to its use when applied to a class of seed.

We have given some thought and spent some time discussing other terms used by crop improvement associations. It was finally agreed that, inasmuch as there was not a unanimity of opinion, that additional terms be omitted from this report at the present time. We recommend, therefore, that this committee report be accepted and that the committee give further time to the study of these terminology.

## STANDARDS

We wish to recommend the following standards for the consideration of members of the International Crop Improvement Association.

1. Not more than one variety of given grain shall be grown per farm where grain is to be inspected for certification. Where more than one variety is grown, special permission must be obtained from the inspecting or certifying agencies.

2. Official or recognized inspectors. Inspections shall be made by trained inspectors employed by the Crop Improvement Association.

3. No crops to be recognized as registered or certified upon which the inspection work has been done by County Agricultural Agent or Smith-Hughes teacher. Trained Smith-Hughes teachers employed on a 9-month basis may do inspection work for the certifying association during vacations and when upon full pay of the association.

4. Field inspection shall be made by an authorized inspector who shall carefully inspect the field prior to harvest, crossing the field diagonal directions at least twice, making at least 10 mathematical determinations as to variety, purity and disease condition. In case of fields showing considerable variation either in the crop plants present, or in the soil, or in fields of exceptionally large acreage, additional inspections are deemed advisable, and their number and location should be left to the discretion of the official inspector.

5. Each threshed grain or seed sample submitted for laboratory inspection shall be accompanied by the guarantee of the grower that the sample is representative of and not better than the entire lot of seed offered for sale by said grower. Official sampling is recommended at the discretion of the certifying agency.

6. Wherever sufficient time lapses between harvest and planting seasons to make a germination test trustworthy, the certifying association shall report on germination test, indicating the percentage of visable seed and the date the test was made.

Additional standards and suggestions for unifying the work were considered, but inasmuch as the committee was not a unit on these points, it was deemed advisable to omit them from this years work and to suggest that they be considered further and final reports brought in after more deliberation during the coming year.

It is suggested that the following table of standards for the three recognized grades of seed of small grains be tried out by the member association during the coming season.

| Class of seed | Varietal field purity percent | Laboratory purity | Maximum allowance of weed seed | | | Maximum allowance of other crop seeds |
|---|---|---|---|---|---|---|
| | | | noxious[2] | other | per ct. | Wheat in oats<br>Oats in barley<br>Barley in Oats |
| Foundation | 100 with a tolerance of 10 plants per acre | 99.7 | none | 10 per lb. | 1/100 of 1% | 1 per lb. |
| Registered | 99.8 | 99.7 | none | 10 per lb. | 1/100 of 1% | 1 per lb. |
| Certified | 99.5 | 99.50[1] | none[1] | 10 per lb. | 1/20[3] of 1% | 8 or 9 per lb. |

*Laboratory impurities shall indicate other crop seeds- weed seed and inert matter exclusive of broken seed (half size or less).

[1] Field crops other than clovers and alfalfa.

[2] Noxious to include all weeds so designated in the state seed law and such other weeds as shall be designated by the State Crop Imrpvement Association.

[3] With the recommendation that the member association use this as the basis of calculation and express in number per pound. This to apply to rye, wheat, oats in barley, barley in oats.

In view of the differences necessarily observed in methods and standards of certification for the different crops, it is suggested that the President name sub-committees, each composed of 3 representatives, on:

a. Alfalfa and clover

b. Cotton and grain sorghums

c. Small grains and Soy beans

It is further suggested that the chairman of each sub-committee be a member of the original committee thus insuring a minimum of lost time and effort. These committees should develop more in detail the standards for certifying the several crops and submit reports which can be brought together and presented as a whole at the 1930 meeting of the association.

We wish to move that this be accepted as a progress report and the committee instructed to continue its work with the assistance of the additional members.

J. C. Hackleman, Illinois Chairman
John Remsburg, Idaho
E. B. Wells, Kansas
B. P. Jones, New York
Waldo Kidder, Montana
R. F. Crim, Minnesota
O. S. Fisher, U. S. D. A.

## STANDARDS FOR ALFALFA SEED

The great losses of clover and alfalfa acreage drew the attention of agronomists and others to the problem of finding out why American farmers were not successful with these most important legumes.

A series of origin or nationality tests soon showed that unadapted seed was largely responsible for this appalling loss of legume acreage. With the passage of the Gooding-Ketcham staining bill in 1923 attention was turned to those areas producing clover and alfalfa seed adapted to the corn belt and more northern states.

At that time alfalfa was divided into two principal groups, Grimm a distinct variety, and Common, a group of alfalfa strain usually classified on the basis of state of origin, such as Utah, Kansas, etc. Since the Grimm is more hardy and better adapted to the corn belt and northern states, farmers in those states want positive assurance that they are getting this variety and not just common alfalfa, much of which lacks hardiness and is unsuited for this territory.

With the development of seed growing organizations in the west the problems of grades and standards also came into prominence. It has been in the foreground of all seed discussions ever since. The growers or their representatives on one side and the consumer or their representatives on the other. In the middle was the seed trade largely responsible for the distribution of this seed through commercial channels.

The first standards outlined by the International Crop Improvement Association as a uniform basis for the producing associations were as follows:

ALFALFA- CLOVERS- GRASSES

(Adopted November 29, 1921)

1. There should be two classes of alfalfa, clovers and grasses of superior varieties which shall receive office and which shall be termed as follows:

a. Registered Seed

b. Certified seed

2. Registered Alfalfa seed shall consist of stocks that will be most desirable for sowing for seed production purposes or, in other words, would be used as foundation stock; it shall have all the requirements of certified seed and in addition it shall be grown with such isolation as to be not less than 20 rods from any other variety of alfalfa.

3. Certified alfalfa seed shall consist of stocks desirable for sowing for hay growing purposes and must meet the following requirement:

a. Origin. Certified seed must trace back to an oficially recognized foundation stock (e.g. Grimm Alfalfa must be clearly traced through reliable source to the original Grimm fields of Carver County, Minnesota)

b. Careful investigation should be made to ascertain the integrity of the grower.

c. At least one field inspection should be made at

such time as to ascertain the presence of noxious weeds and mixtures of inferior varieties.

d. As a further test to assist in the identification of the most hardy strains of alfalfa, we suggest that the growing of representative samples in rows under green house conditions, for comparison with known Grimm and known common during the short fall and winter days of the Northern States or provinces, may prove an effective and fairly rapid guide in determining the degree of hardiness.

e. Fields having satisfactory pedigree and passing the necessary test should be registered according to definite regulations of a state or provincial organization and that all information, affidavits, location of the fields, etc., be kept on file by the certifying organization of each state or province.

f. Standard of purity and germination shall be determined by the organization within each state or province, but no seeds infested with seriously noxious weed seed or seed containing more than one per cent of ordinary weed seeds shall be accepted.

The latest requirements were adopted at a meeting held at Brookings, South Dakota, June 1932.

At this meeting were representatives of the International

Crop Improvement Association, State Producing Organizations, Consumers Distributive Organizations and the Seed Trade.

There are several questions of vital importance to the grower, seed dealer and consumer of alfalfa seed when grades and standards are set.

1. Is the producer of the best grade compensated for his work?

2. Are the lower grades the result of climatic or local conditions that are uncontrolable or are these grades for the producer who is too indifferent to try to produce the best grade?

3. Can the reputable seed dealer handle the best grade (blue tag) in competition with his neighbor who advertises "Certified Seed" (which may be yellow tag) at a much lower price?

4. Is the consumer of the yellow tag grade a booster for "Certified" seed when he looks at his purchase and after he sees the crop from that purchase?

These questions have been discusses individually and in meetings. It may be that a more comprehensive view can be had by a study of the certification from the foundation stock through the necessary cleaning processes to the final product.

For a number of years the certification of alfalfa was confined to the one variety, Grimm. All fields to be eligible for inspection had to have a pedigree which traced back to the original seeding of Wendell Grimm in Carver County, Minnesota. Today the large part of certified seed is Grimm, but new varieties are gradually gaining in production and demand.

Hardigan-must trace to the original seed distributed from Michigan State College.
Cossack- to the original stock from Professor Hansen.
Ladak- to the original lot of seed imported by the United States Department of Agriculture.

The states certifying alfalfa are agreed on the sources or origins of the seed which may be used for sowing a new field of alfalfa for seed production. Alfalfa is a perennial and lends itself to the production of seed over a number of years. Some certified fields in the west are from ten to twenty years old.

Each association keeps a permanent record on each field, adds to or subtracts from as new seedings are made or old fields plowed. This permanent record is valuable in many ways. The inspector knows what kind of seed the field produced in previous years. The weed seed present, condition and practices.

The rield inspection varies in minor details in the different states.

Some associations demand a yearly inspection, others make the field inspection the first year and at their own discretion thereafter. Each new field must be inspected for every grower.

The technic of making the inspection of alfalfa fields seems to be more nearly the same than that of small grains. This is no doubt due to the fact that there is no orderly arrangement of the plants which would permit an accurate count.

The hoop method was and still is used to a small extent, but is not considered necessary in making an accurate inspection. In most states the inspector walks through the field visiting all irregularities of stand and unusual depressions, rock piles, and straw stacks looking for and noting the presence of noxious and common weeds, mixtures and bloom of the alfalfa. These are noted on the report in various ways, very heavy, heavy and trace. Rejection, on the field inspection, is generally made on account of weeds or mixtures that cannot be taken out in the cleaning process.

A comparison of the field inspection report for a number of fields taken at random and compared with the final analysis show that the inspection of Michigan fields is thorough and accurate. The weed seeds and other crop mixtures listed in the field inspection reports are found in the cleaned samples unless the seeds produced by the plants enumerated can be cleaned out over the ordinary screens or by a special process.

There are certain crop plants and weeds that can be present in a field without being noticed by the best inspector. Such plants as Alsike, sorrel, catchfly, buckhorn and plantain can easily be obscured by a rank growth of the alfalfa. It must also be borne in mind that the grower often walks over his field after official inspection is made and each time he usually comes out of the field with at least one armful of objectionalbe plants. Additional rogueing is done at the time of cutting. For this reason, a field inspectors report may indicate the presence of some seed that will not be found in the cleaned sample.

Where a foreign seed appears in the cleaned sample which was not reported in the field inspection, it could be due to negligence on the part of the inspector or more likely to have been brought in by the huller. In field #6 no catchfly shows in the field inspection report. It is such a small amount it could very easily be hidden under the alfalfa or the huller might have been badly contaminated and shook enough out of cracks in the machine to sprinkle it through the entire lot as it was hulled. The noxious weed, quack grass, found in this field was removed over a special mill which accounts for this weed not being present in the cleaned seed.

Precautions in threshing are continuously advocated by association officials. Mixtures of other crop seed, weed seed, and other varieties of the same seed are too often carried by a community or custom huller.

All associations require sealing of the bags before the seed leaves the farm, whether cleaned or uncleaned. The sealing is done by grower or association inspector as follows:

Montana- by grower

Idaho- by State Official

Michigan- by representative of Crop Improvement Assn.

Utah- by men appointed by state board of agriculture at the huller

South Dakota- by grower

In the states of Montana and South Dakota the grower seals the seed only if the seed is leaving the farm uncleaned. If cleaned on the farm it must be sealed by a representative of the association.

# FIELD INSPECTION REPORT

| | WEEDS | CROP | SEED PER POUND FINAL ANALYSIS |
|---|---|---|---|
| Field #1 | Few thistles trace dock dodder, chess quack and buckhorn | Blue grass timothy | Timothy 450<br>Alsike 270<br>Catchfly 270<br>Peppergrass 180<br>Buckhorn 180<br>Red Clover 90<br>Sweet Clover 90 |
| Field #2 | Trace Canada Thistle | Sweet clover Blue Grass | Alsike 90<br>Timothy 270<br>Red Clover 180<br>Dock 90 |
| Field #3 | Trace dock Catchfly and Thistle | Few patches Red and Alsike Clover | Red Clover 90<br>Dock 90<br>Alsike 90<br>Catchfly 90 |
| Field #4 | Trace Sowthistle Dock, chess, wild carrot, Prickley lettuce. Remarks: None in sufficient amount to cause trouble. | Slight trace Sweet, Red and Alsike Clover. Red Top and Kentucky Blue Grass. Timothy | Sweet Clover 180<br>Alsike 180<br>Dock 90 |
| Field #5 | Slight trace Lambsquarter Dock, thistle Sow thistle and Wild Carrot. | Slight trace Timothy, Red and Sweet Clover Kentucky Blue Grass | Timothy 270<br>Alsike 90<br>Sorrell 90 |
| Field #6 | A general sprinkling of quack grass | Trace of June and Alsike Clover | Dock 180<br>Red Clover 90<br>Catchfly 90<br>Alsike 90 |

Since the certification tag is sealed to the bag it is necessary for the grower to submit a representative sample of the cleaned seed for analysis and germination. Should this test not agree with the check sample drawn at the time the seed is sealed by a representative of the association, the association reserves the right to reseal and retag at the growers expense.

When the seed is cleaned anywhere but on the farm it must be at a plant authorized by the state association and in the presence of a representative of the association who seals the sacks and draws the official sample for analysis.

## Grade Requirements by State Associations.

Idaho, Montana, Utah and South Dakota have adopted a uniform standard for the three grades of seed as follows:

MINIMUM REQUIREMENTS REGISTERED ALFALFA SEED
GRADES- IDAHO
Crop Years 1931-1932

| Grade | Grade points | Crop of 1931 | Crop of 1932 |
|---|---|---|---|
| Idaho Fancy Blue Tag | Seed purity | 99.25 | 99.50 |
| | Noxious weeds | Free | None |
| | Sweet clover | 1/32 of 1% (90 per lb) | 1/32 of 1% (90 per lb) |
| | color | 92% | 92% |
| Idaho Choice Red Tag | Seed Purity | 98.50 | 99.0 |
| | Noxious weeds | Free | Free |
| | Sweet Clover | 1/8 of 1% (360 per lb) | 1/16 of 1% (180 per lb. |
| | color | | |
| Yellow tag sample grade | Seed purity | 91.0 | 97.5 |
| | Noxious weeds | 27 per lb | 27 per lb |
| | Sweet clover | 5% | 1% |
| | Germination | 65% | 70% |
| | Test weight | --- | 59 lbs |

The following explanations of the above grade requirements are necessary to properly understand the grades:

"None"- means no noxious weeds

"Free"- means a tolerance of 8 seeds per pound, but not necessarily that number present. If any noxious weeds are present they are so designated on the tag.

(A tolerance of 1/2 of 1% inert matter not materially affecting appearance of seed is permitted in all grades)

Noxious Weeds: The only noxious weeds permitted in any grade are dodder, fanweed and mustard. No seeds of perennial noxious weeds are allowed in Registered seed.

Color: The percentage in the table under color, namely 92% and 87% mean not more than 8% and 13% discolored seed will be allowed in Blue and Red Tag seed respectively.

Tag Colors: Idaho Fancy-- Blue Tag ) It was the feeling of those
Idaho Choice- Red Tag )

in attendance at Rapid City, especially representatives from the consuming states and seedsmen, that sufficient time and money had been spent in advertising red tag to overcome any prejudice toward this color. Also that White tag had not sold readily due to ignorance on the part of the consumer as to this new tag color. Therefore, it was decided that all states would return to the red tag to designate our second grade of seed.

Minimum Weight Per Bushel for Yellow Tag seed: For many years there has been a difference in opinion between the different states as to what constituted screenings. After a series of weight tests it was found that seed weighing less than 59 lbs per bushel was of little commercial value. It was, therefore, decided at the Rapid City conference that in order to make a ruling for screenings uniform throughout all producing states, the test weight of 59 pounds per bushel would be accepted as minimum weight of seed eligible for yellow tag. Any seed weighing less than 59 pounds per bushel will be classed as screenings and will not be eligible for sealing.

# MICHIGAN STANDARDS

## Certified Hardigan Alfalfa (Fancy) Blue Tag

| | | |
|---|---|---|
| Purity | 99.25 | |
| All Foreign Seed | .50 | |
| All Weed Seed | .10 | |
| All inert Matter | .75 | |
| Combination Foreign seed plus Inert Matter | .75 | |
| Legally Noxious | 0 | |
| Sweet Clover | 90 | per pound |
| Catchfly | 90 | per pound |
| Buckhorn | 90 | per pound |
| Germination-Sprouts and hard seed | 90% | -2 |

## Certified Hardigan Alfalfa (Choice) White Tag

| | | |
|---|---|---|
| Purity | 99.00 | |
| All Foreign Seed | .75 | |
| Weed Seed | .25 | |
| All Inert Matter | 1.00 | |
| Combination Foreign seed plus Inert Matter | 1.00 | |
| Legally Noxious | 0 | |
| Sweet clover | 360 | |
| Catchfly | 180 | |
| Buckhorn | 180 | |
| Catchfly plus Buckhorn | 180 | |
| Germination-Sprouts and hard seed | 85 | -2 |

In setting any standard the limits defined are usually minimum for that particular grade. It does not necessarily follow that all the seed in that grade will be of that actual minimum purity. This is proven conclusively by the average analysis of samples that made up the "Fancy" and "Choice" grades of Michigan Alfalfa seed this past year. One hundred and forty samples analyzed by the state seed testing laboratory showed a purity of 99.776% for the fancy grade and 16 samples showed a purity of 99.61 for the choice grade.

The actual placing of a lot of seed in one grade or the other is not generally due to excessive amounts of weeds, other crop, and color in one lot of seed. Any one or two may be responsible for the lot being placed in a lower grade. The grade being determined by the amount of each or both contained in the sample.

The maximum tolerance of weed seed, other crop seed or discoloration for each grade has been mutually agreeable to the grower and consumer as it applies to the first (Blue Tag) and second (Red Tag) grades of the western associations. The third (Yellow Tag) grade is considered too low in purity and has too high a tolerance of weed and other crop seed to be worthy of carrying the certification tag of any state. The consuming states are very much opposed to this class of seed coming to their farmers as certified seed. It is not a high quality product.

Analyzing the Yellow Tag grade it is found that the sweet clover content of 1% maximum can be expressed as 2500 per pound. In a new seeding at the rate of 10 lbs. per acre there would be a possibility of 25,000 plants on an acre, or one plant every two square feet. The consuming states are right in questioning the advisability of putting a certification tag on a lot of seed with such possibilities.

In addition to the sweet clover there may be 27 noxious weed seeds per pound. These may be all dodder, fanweed or mustard or a combination of all of them. Not a particularly desirable mixture on farms now free of these weeds.

The germination of this grade is 70%. This means that as much as 30% can be brown or immature seed which does not grow. The consumer of certified seed is entitled to a product that has a high percentage of vigorously growing seed.

There are only two characteristics of certified seed in the yellow tag grade. Genuine variety and adapted origin. Purity and freedom from weed and crop seed is undoubtedly below the accepted standards for seed that is carrying a certified tag.

## DISCUSSION

There is considerable variation in requirements for new growers starting the production of certified seed. The highest quality seed comes from experiment stations or the following generation. It is advisable that a new grower start with the very best seed obtainable. This maintains the quality of certified seed at a higher standard than where certified seed is used by new growers in producing certified seed. Those associations permitting a new grower to use certified seed uphold their ruling on the quality of the certified seed they produce. There are cases where this is true. Michigan certified Hardigan Alfalfa Fancy grade meets all the requirements of Blue Tag grade which is recognized as foundation stock by all states.

There is a possibility that states allowing the use of certified seed might run the risk of growers getting very inferior seed from other states. This possibility can be reduced to a minimum by a continuous program of education on the part of the leaders and officials in crop improvement work.

A uniform quality of seed for foundation stock is desirable, but not absolutely essential.

The qualifications necessary for a variety to be eligible for certification vary widely. A majority of the states require the approval of a committee, one or more members of which is a member of the Plant Breeding Staff of the College or experiment station. Other associations go a step further and require that the breeding and testing of the variety be

done under the supervision of the plant breeding department before it is eligible. The opposite extreme is the association which allows a variety to be certified with only selection or breeding work done by the grower. This latter standard would permit a variety to be certified under two different varietal names. A grower desiring publicity could name a selection from a mediocre variety after himself and put it on the market as such. It increases the list of certified varieties unnecessarily without adding any desirable characters as selection within a pure line is valueless.

The majority of states exercise close supervision and prevent the desire of growers to certify their own varieties by an intensive advertising campaign on the certified varieties they know to be superior. Virginia certifies too many varieties of corn and Oklahoma too many varieties of grain sorghums. It hardly seems possible that more than two outstanding varieties would be required for each section of a state. There are states where only three or four outstanding varieties are used to supply all sections.

The number of varieties of any one crop should be held within reasonable limits. A new variety should be eligible for certification only after proving its superiority to one or more of the varieties being certified.

Spartan Barley in Michigan has replaced Wisconsin Pedigreed and Black Barbless Barley. It outyields both consistently and has the smooth awn instead of the barbed awn which is so objectionable on the Wisconsin Pedigreed. It replaced the

Black Barbless because of its superior yield and white color which is more preferable than the black.

The field inspection methods vary rather widely as do also the standards to which they attain. A large part of this difference is in the viewpoint of the association official. Some look on the field inspection as almost entirely educational and depend on the bin inspection to reject crops of poor quality. The reverse is true where conditions are such that neither a bin or sample inspection is adequate. Particularly with winter grains the time is limited to such an extent that a bin or sample inspection is almost impossible under some conditions.

The field inspection is decidedly worthwhile from an educational and qualitative standpoint. The presence of varietal and other crop mixtures, weeds and disease is important information. The method of getting it should be accurate as well as practical. When an inspector becomes proficient enough to estimate stands so as to average the same number of heads each time it becomes a simple matter to make a large number of random samplings for impurities and disease.

When a crop is likely to cross state lines it would seem advisable to have a system of field inspection and definite standards for a field to meet so that the buyer of the seed could be informed of the requirements the seed had to meet in the field before it was eligible for the bin or sample inspection. Such standards can be worked out on a percentage basis or number of plants in a row of specified length. The exact method of making the field inspection and the final standards of purity will

depend largely on local or sectional condition.

The bin or sample inspection is made on thresher run and recleaned samples. In either condition the sample is accepted as being representative of the crop in that condition. Much time has been spent in teaching the grower the way to get a representative sample. There is always a possibility that the sample is not representative either through intentional error or ignorance. Very few such cases escape the notice of the alert official who is always watching and checking new growers or old ones who may need it.

If the sample is submitted uncleaned it is cleaned at association headquarters to determine the required screens so that this information can be given the grower. The analysis and germination test is made on the cleaned seed. The integrity of the grower and a knowledge of his equipment must be known. Under such a system there is a possibility of certification tags appearing on bags containing very poorly cleaned seed. Here again the officials of the association must be watchful and take every necessary precaution to see that the buyer of certified seed receives a well cleaned and graded product. Utah and Idaho require that all certified seed be sealed in the bag by a representative of the association or state department of agriculture. At the time of sealing a representative sample is drawn which is official. Although this is the ideal method it is not always practical. Other methods of checking are almost as effective with considerably less trouble and expense. There is very little difficulty when the number of growers and the amount of seed produced is considered.

# ALFALFA

The certification of alfalfa seed coming after several year s experience with small grains and other crops was started on a more uniform basis in the states producing the majority of hardy seed. Since the start of this work there have been changes in the methods of inspection and also the standards.

The foundation stock as required by each state has remained constant and uniform. There is only one recognized strain of each variety certified. Hardigan, Grimm, Cossack and Ladak have definite origins and all fields must trace back to those original sources. The western group of states requires the use of Blue Tag seed as foundation stock for seeding new fields. Michigan permits the use of either Fancy or Choice grade of the certified. Each is particularly well suited to their own conditions.

The field inspection of alfalfa presents a little different problem than some of the other crops that are certified. The The usual practice of seeding does not produce a crop in rows or other arrangement that would make a linear measurement practical. Stands vary considerably in the same field so that a count in a given area would not be entirely accurate. The hoop method is used with success as are also the observations and estimates of trained inspectors. The close agreement of field inspection and final analysis has been mentioned previously. It is evident that the inspection work in the field is accurate when such results are obtained.

Field inspection of alfalfa is usually made when the crop is in one-half to three-quarters bloom for the express purpose of noting the variegation of the bloom. This checks the genuineness of the variety. If it were not for the permanent records kept by each association it is extremely doubtful if any accurate identification of variety could be made in the field by the variegation of the bloom or any other plant characteristics. With a definite written record and pedigree the time of inspection could be varied so as to check on weeds, crop mixtures and the handling of other alfalfa acreage on the farm.

There is some slight variation as to when the threshed seed is first sealed. Utah and Idaho seal the uncleaned seed at the huller spout. A representative of the state department does the sealing. In Michigan the seed is sealed by an association inspector before it leaves the farm. Montana and South Dakota permit the grower to seal the bags if it is leaving the farm uncleaned. If cleaned by the grower it is sealed by an association inspector who draws an official sample.

The ideal place to seal the seed is at the thresher spout. There can be little doubt as to pedigree if the inspector sees it threshed out of a stack in the field or barn. This possibility of mixing two varieties is being reduced to a minimum by a new regulation which permits a grower to raise only one variety on a farm. All other alfalfa acreage must be out for hay or disposed of in some way other than for seed production.

Until this ruling is enforced 100% there is always a chance for a grower to mix two lots of seed. Each association

will have to take the necessary precautions to prevent such an occurrence until the grower is limited to one kind of seed which will automatically remove such a possible accident.

In every state the official analysis is made by the state seed testing laboratory. Since all the state analysis follow one set of rules in testing the only variation is in personal interpretation of those rules. This is not a serious variation.

The actual grade of each lot is based on the official analysis which also includes a color count to grade the seed on appearance. The actual grading process is mechanical when the grades are as definitely defined as they are now.

At this time even though the quality of the yellow tag grade has been raised very materially above previous standards it is not of high quality enough to warrant it going to the consumer in a sealed bag carrying the label of a crop improvement association. Any seed that does not qualify for the Blue or Red tag should be rejected by the association.

There is need for a complete study on the cost of producing the various grades of seed as recommended for adoption by the International Crop Improvement Association.

The production of this seed must be profitable to the producer without being exhorbitant to the consumer. The standards cannot be so low that the producer can raise his crop without extra expense or labor and then demand a premium for the product. Such a condition will cause the good seed movement to fall of its own weight.

There is a necessity for a complete survey on those crops which move from state to state or section to section. An entirely different set of standards that are applicable to the section can be used on a crop such as cotton which moves in a well defined area. The same is true of peanuts, tobacco, and sorghums. Alfalfa, wheat, rye, oats and corn are more often moved long distances. The standards should be uniform.

## SUMMARY

The foundation stock seed required for the production of certified seed varies by state from those whose standards require the use of approved foundation stock or registered seed to those who permit the sowing of certified seed. The same grade of other associations is recognized as eligible planting stock.

The method of making the field inspection is not uniform. Three states reporting require a minimum of ten counts for disease and varietal mixture. They also require the inspectors to cover the field by a uniform course except in case of irregularities in the shape of the field or the stand of grain. Those associations not specifying a course or minimum number of counts depend on the judgement of their inspectors to cover the field in such a way as to get an accurate report on each field. In addition, Michigan requires each inspector to "Observe the general condition of the farm, facilities for cleaning and handling seed, characteristics of the grower and any other factors that may have a direct or indirect bearing on certified seed."

There is a variation in the amount of varietal mixture and disease allowed in the field by each association. The outer limits are from .1% to 1% disease transmissable on the seed and .01% to .5% varietal mixture. The minimum number of weeds, either noxious or common, allowed is not definitely stated. This is left to the judgement of the inspector.

The bin or sample inspection is taken by the grower or a representative and may be taken before or after cleaning, depending on that state association requirement. The analysis is made by either an official of the association or the state seed testing laboratory. Where convenient, tests are made by both and compared.

The final analysis and standard required for certified seed is based on the seed as it will be sold by the grower or seed dealer. Precautions are taken to be sure the sample is representative of the crop as it will move from the growers farm. The size of the sample varies from one quart to one peck.

The accepted standard for purity is 99.00%. The varietal mixture ranges from .1% to .5%; weed seed (not noxious) 1 per pound to 10 per pound. Utah allows one noxious weed seed per pound. Inert matter is not stated in numerical figures. It is variable with each season and changes accordingly. Germination for small grains is set at 90% or better except in special cases such as Indiana where tests are not made on winter grains.

The crop as finally certified moves from the farm in bags that may be sealed as required in Idaho and Utah or optional as in Oklahoma. The other associations do not require the bags to be sealed except under unusual circumstances.

The International Crop Improvement Association is devoting considerable time to the formulation and discussion of methods and standards applicable to conditions in all of the states. This work is moving forward from year to year as a result of the time and effort put forth by the members of the committee handling special crops.

## ALFALFA

The foundation stock used in each state for seed production has the same pedigree and is of practically the same quality. The varieties certified are Grimm, Hardigan, Cossack and Ladak.

The field inspection methods and standards are very uniform and the results of the field inspection compared with the final analysis of the clean seed shows the thoroughness and accuracy of the field inspection.

The grades of seed vary in name and also in quality due to the inclusion of the yellow tag grade by the western associations. This is a low quality grade in every respect except it is genuine variety and adapted origin. It is seriously questioned by representatives of consumer states if this class is worthy of carrying a certification tag.

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