

## 2020 Rule Change Proposal 26

**Purpose of Proposal:** To clarify the germination evaluation of seedlings with three cotyledons and twin seedlings in Volume 4, Seedling Evaluation, of the AOSA Rules

**Present and Proposed Rule:** AOSA Rules Volume 4, Sections 2 and 3:

### 2.4.1 Dicotyledons and gymnosperms.

**c. The Cotyledons.** The cotyledons are the storage structures of the embryo. They may be only a small portion of the seed in species with endosperm, perisperm or female gametophyte storage tissue, or they may occupy a large portion of the embryo when they are the primary storage tissue (e.g. *Phaseolus vulgaris*). In epigeal species, the cotyledons may grow quite large and become the first photosynthetic structures of the young plant. In hypogeal species the primary function of the cotyledons is to provide nutrients to the growing seedling until it can produce its own nutrients. In most species the cotyledons shrivel and drop off as their reserves are depleted. In a few species (e.g. *Cucurbita pepo*, pumpkin) the cotyledons may persist well beyond the seedling stage of growth. **Note: For dicotyledons, sometimes a seed produces a seedling with only one cotyledon or an additional (third) cotyledon. This should be regarded as an acceptable defect as long as the seedling is otherwise normal. A seedling with more than three cotyledons is always considered abnormal.**

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**3.5.3 Counting seedlings of multiple seed units and coated seeds.** Seed units containing more than one true seed, e.g. beet clusters (*Beta vulgaris*), New Zealand spinach (*Tetragonia tetragonoides*) or multiple florets of certain grasses (e.g. *Dactylis glomerata*), are tested as single seeds and are classed as normal if at least one seedling develops and continues to grow under favorable conditions. When a seed unit (i.e. a single cluster or multiple floret) produces two or more seedlings it is only counted as one seedling. (See section 6.5 c of the AOSA Rules for Testing Seeds Vol. 1.)

**For seeds of species that normally produce only one seedling but have produced more than one (true seeds containing more than one embryo), the entire seedling is classified as normal and counted as one if at least one of the seedlings produced is normal and has all the essential structures. Fused seedlings are regarded as abnormal.**

For coated seeds the seed units should be placed on the substratum in the condition in which they are received. No rinsing, soaking or other pre-treatment should be used. Each coated seed is considered a seed unit when counting the seedlings. If symptoms of phytotoxicity are evident on seedlings from coated seeds planted on artificial substrata, a retest should be conducted in sand or soil. (See section 6.8 I of the AOSA Rules for Testing Seeds Vol. 1.)

For specific instructions on de-coating Poaceae seed kinds, see section 6.8 I of the AOSA Rules for Testing Seeds Vol. 1. If coated seed is received with a request for a test on de-coated seed, then the germination report should include specific information about the procedure used.

**Harmonization and Impact Statement:** The added clarification in seedling evaluation would harmonize with the wording used in the ISTA Handbook on Seedling Evaluation (4<sup>th</sup> ed., 2018):

#### 8.1.2 Seedlings regarded as slightly defective

Experience has shown that certain defects or deficiencies on particular essential parts of a seedling can be regarded as slight and be tolerated, because they would not hamper development into a satisfactory plant, provided the seedling is otherwise normal.

The following are regarded as acceptable defects:

...

- One cotyledon or primary leaf instead of two or an additional (third) cotyledon or primary leaf;

...

#### 8.4.7.2 True seeds containing more than one embryo

In the seeds of most species twins or even triplets are possible, but exceptional and rare. They are counted as one and classed as normal if at least one of the twins (or triplets) is normal. Fused twins or triplets are regarded as abnormal.

The new wording would also harmonize with the Canadian M & P, which states the following:

#### **Section 4.10.6 Two or More Seedlings from One Seed Unit**

...

- b. Multiple embryos: The development of two or more embryos in one seed, a phenomenon known as polyembryony, occurs occasionally in many kinds of crop seeds and more frequently in a few (e.g. in Kentucky bluegrass). When such seeds produce at least one normal seedling, they are considered to have germinated and are included in the percentage of germination.

**Supporting Evidence:** A discussion started after the Flower Seed Committee conducted an evaluation survey using drawings of seedlings that included the defects of three cotyledons and “twin” seedlings. It was evident that some clarification was needed in the AOSA Rules for the evaluation of these types of seedlings. For three cotyledons, only Caryophyllaceae and Violaceae in Volume 4 have notes indicating that three cotyledons are to be considered normal. In an email discussion with Riad Baalbaki of the AOSA Germination subcommittee, he stated the following: “There is nothing in the literature that would indicate negative effect of 3 cotyledons on seedling growth if other parameters look normal.” (April 20, 2019)

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