

2021 Rule Change Proposal 10

Purpose of Proposal: To modify the pure seed unit definition for *Cannabis sativa*, marijuana and industrial hemp, to include the persistent perianth that may occasionally remain attached to the achene.

Present Rule and Proposed Rule: (proposed changes indicated in red text)

Table 3A. Pure seed unit definitions

PSU Number	Description of Pure Seed Unit
27	<p>Intact achene whether or not a seed is present. Piece of broken achene larger than one-half of the original size, unless no seed is present. Seed, with or without pericarp/seed coat. Piece of broken seed, with or without pericarp/seed coat, larger than one-half the original size.</p> <p><u>Special consideration:</u> <u>For <i>Cannabis sativa</i>, the persistent perianth and bract, when attached to the achene, are considered part of the pure seed unit.</u></p>

Harmonization and Impact Statement:

The natural dispersal unit for *Cannabis sativa* is an achene that is enclosed in a persistent perianth and perigonal bract. The perianth may or may not be removed during seed conditioning. The Canadian Methods and Procedures for Seed Testing (M&P) provides a pure seed definition for the achene of *C. sativa* that appears to include the perianth when present (see supporting evidence). The ISTA Rules (2020) assign *C. sativa* to PSD 4 that allows for achene with or without bracts (see supporting evidence). The Federal Seed Act (FSA) does not have a specific definition for seed unit of *C. sativa*; however, this species fits under the category of intact fruits belonging to families in which the seed unit may be a dry indehiscent one-seeded fruit. (see under supporting evidence).

Supporting Evidence:

The kinds of seed assigned to PSU 27 are members of the Asteraceae (Composite family) with the exception of *Cannabis* (Cannabaceae). The seed unit consists of a single-seeded, indehiscent fruit commonly referred to as an achene (Figure 1A). In *Cannabis*, the superior ovary is derived from two carpels that unite to form a one-chambered ovary containing a single ovule (Heywood et al., 2007). The pistillate flower is solitary in the axil of a subtending bract located at the base of a leaf petiole; the pistillate flower is enclosed by a glandular leaf-like perigonal bract; and in the mature flower, the perianth appears as a thin membrane appressed to and surrounding base of ovary (Small, 1997; Spitzer-Rimon et al., 2019).

Samples of mature fruits may contain fruits enclosed by persistent perianths and perigonal bracts (Figure 1B). During the purity analysis, the current PSU 27 description requires the removal of

structures adhering to the achene. The Purity Subcommittee received a request from one of its members to include the perianth and perigonal bract as part of the pure seed units because it can be difficult and time consuming to remove these structure from the achene without causing damage to or loss of the achene in the process. During email exchanges among Purity Subcommittee members on this subject it was agreed this is an issue in labs that routinely test *C. sativa* samples, particularly for samples grow under field conditions as opposed to those produce in greenhouse situations [Meyer pers. comm., 10/8/2020].

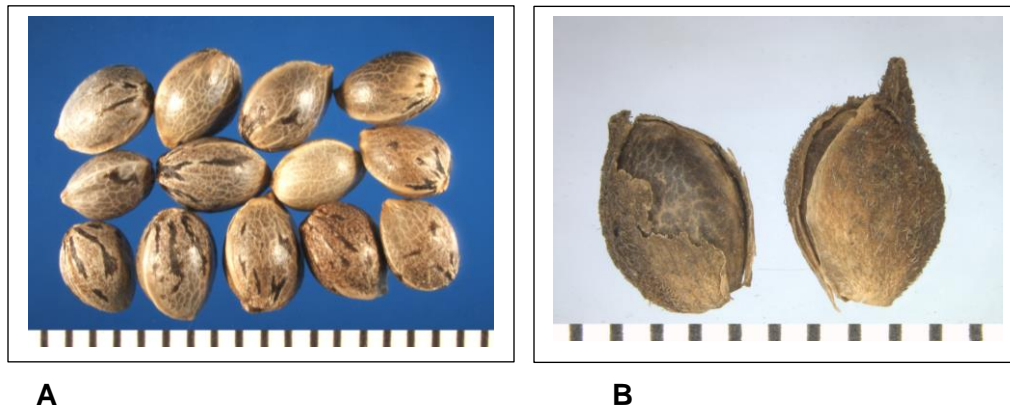


Figure 1. *Cannabis sativa*, industrial hemp. A – mature achenes. B – mature achenes enclosed by the persistent perianth and perigonal bract.

For comparison, please see excerpts from the Federal Seed Act, ISTA Rules, and Canadian M&P below (specific references to perianth and bracts are highlighted in yellow):

Pure seed unit description from the Federal Seed Act (2020)

201.47a Seed Unit.

The seed unit is the structure usually regarded as a seed in planting practices and in commercial channels. The seed unit may consist of one or more of the following structures:

- (c) Dry indehiscent fruits in the following plant families: buckwheat (Polygonaceae), sunflower (Asteraceae), geranium (Geraniaceae), goosefoot (Chenopodiaceae), and valerian (Valerianaceae);

201.48 Kind or variety considered pure seed.

The pure seed shall include all seeds of each kind or each kind and variety under consideration... The following shall be included with the pure seed:

- (f) Intact fruits, whether or not they contain seed, of species belonging to the following families: sunflower (Asteraceae), buckwheat (Polygonaceae), carrot (Apiaceae), valerian (Valerianaceae), mint (Lamiaceae) and other families in which the seed unit may be a dry, indehiscent one-seeded fruit. For visibly empty fruits, refer to inert matter, sec. 201.51(a)(6);

Pure seed unit description from ISTA Rules (2020) for Cannabis sativa:

PSD 4

Achene, with or without beak, pappus or **bracts**, including achenes where two or more seed units are joined together by fused pericarps, unless it is obvious that no seed is present.

Piece of achene larger than one-half the original size, unless it is obvious that no seed is present.

Seed, with the pericarp/testa partially or entirely removed.

Piece of seed larger than one-half the original size, with the pericarp/testa partially or entirely removed.

Pure seed unit description for Cannabis sativa in the Canadian M&P (2016):

3.2 DEFINITIONS

3.2.1 Seed

A seed, in laboratory practice, is defined as "a structure which contains at least one ripened ovule with or without accessory parts".

In many crop plants, the structure commonly regarded as the seed is botanically a fruit. Thus, in addition to true seeds, the foregoing definition includes florets and caryopses in the Poaceae, achenes, cypselas, schizocarps, mericarps, nutlets, one- and two-seeded pods of small-seeded legumes, seed balls, or portions thereof, in *Beta* spp., fruits with enclosing calyx as in *Tetragonia tetragonoides*. Bulblets, such as those of *Poa bulbosa*, are also considered seeds, although they do not contain an ovule, because they can grow into a plant if sown. It also includes coated seed.

Very often structures which do not strictly comply with the above definition are included in the pure seed because the analyst cannot tell whether or not the ripened ovule is present.

3.2.2 Pure Seed

The pure seed must include seed of the crop kind (or kinds) under analysis which must be named in labelling, and includes small, immature, shriveled, cracked, insect damaged, diseased, sprouted, or otherwise injured seeds, provided that;

- a. In the case of pieces of seeds, any piece which is larger than one-half the original size must be considered pure seed except that seeds of the Fabaceae and Brassicaceae with their seed coats entirely removed must be regarded as inert matter. For separated cotyledons of seeds of the Fabaceae refer to Section 3.2.5.a.iii;
- b. Intact seed units (commonly found dispersal units e.g. achenes and similar fruits, schizocarps and mericarps with or without perianth and regardless of whether they contain a true seed) must be considered pure seed unless it is readily apparent that no true seed is present;

(The term "readily apparent" must be interpreted to mean that the purity analyst should not use a diaphanoscope, stereoscopic microscope, hand lens, pressing or other special equipment or means to detect whether true seeds are present);

References

Heywood, V. H., R. K. Brummitt, A. Culham, O. Seberg. 2007. Flowering Plant Families of the World. Firefly Books Ltd., Richmond Hill, Ontario, Canada.

Small, E. 1997. Cannabaceae, Hemp Family. pp. 381-383. In: Flora of North America, Vol. 3 Magnoliophyta: Magnoliidae and Hamamelidae. Oxford University Press, New York, NY.

Spitzer-Rimon, B., S. Duchin, N. Bernstein, and R. Kamenetsky. 2019. Architecture and florogenesis in female *Cannabis sativa* plants. Front. Plant Sci. 10:350. doi: 10.3389/fpls.2019.00350

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