Sampling Guidelines for Hemp
U.S. Domestic Hemp Production Program
Issued January 15, 2021

Purpose:
1. Standard and Performance-based sampling guidelines are specified for field and indoor sampling of hemp. States and Tribes shall develop their own sampling protocols in accordance with §990.3.

2. Samples are taken to obtain specimens for the measurement of total tetrahydrocannabinol (THC) content, which determine whether the specimens are hemp or marijuana. The measurements are intended to be representative of the total THC content in a "lot" of hemp crop acreage as identified by the producer. Hemp producers may not harvest hemp prior to the hemp being sampled for THC concentration. Testing procedures are provided in a separate guidance document.

Scope:
1. Samples collected under this procedure are acceptable for submission to a qualified testing laboratory for determination of total THC concentration in hemp. After December 31, 2022, all laboratories testing hemp under the U.S. Domestic Hemp Production Program must be registered with the DEA in accordance with §990.3(a)(3)(iii)(H) and §990.25(g)(iii).

2. Since the THC content of hemp generally peaks as the plant ripens, the timing of when sampling occurs is important to accurately measure total THC concentration and monitor compliance with the USDA hemp production program. Harvest shall be completed within 30 days from sample collection.

3. Samples shall be collected only by a trained sampling agent. Sampling agents must be trained under applicable USDA, State, or Tribal training procedures. States and Tribes must maintain information, available to producers, about trained sampling agents. Hemp producers may not act as sampling agents.

4. It is the responsibility of the licensed producer to pay any fees associated with sampling.

5. It is the responsibility of the sampling agent to pay any fees associated with sampling agent training or testing.

Summary of Practice:
1. This practice provides procedures for entering a growing area and collecting the minimum number of plant specimens necessary to represent a homogeneous composition of the "lot" that is to be sampled. A trained sampling agent enters a growing area, strategically examines the growing area, establishes an approach for navigating the growing area, and collects individual specimens of plants in order to obtain a representative sample of hemp in the designated lot.

2. Cuttings from each "lot" of hemp crop acreage, as identified by the producer, and submitted to and uniquely identified by the Farm Service Agency (FSA) per the requirements of the USDA hemp production program, shall be organized as composite samples. The terminology used by FSA to denote land areas include terms like "farm," "tract," "field," and "subfield," which are equivalent to AMS's term "lot." For the purposes of these procedures, a "lot" is a contiguous area in a field, greenhouse, or indoor growing structure containing the same variety or strain of cannabis throughout. In addition, "lot" refers to the batch of contiguous, homogeneous whole of a product being sold to a single buyer at a single time. The size of the "Lot" is determined by the producer in terms of farm location and field acreage and is to be reported as such to the FSA.

Performance-Based Sampling Protocols:

1. States and Tribes may develop performance-based sampling protocols.

2. Performance-based sampling protocols may consider seed certification processes, other process that identify varieties that have consistently resulted in compliant hemp plants, whether the producer is conducting research on hemp at an institution of higher learning or that is funded by a Federal, State, or Tribal government, whether a producer has consistently produced compliant hemp plants over an extended period of time, and other similar factors.

3. Performance-based sampling protocols may consider alternative requirements for operations that grow "immature" cannabis that does not reach the flowering stage. These facilities may grow seedlings, clones, microgreens, or other non-flowering cannabis, as determined by the State or Tribe.

4. A performance-based sampling protocol must have the potential to ensure, at a confidence level of 95 percent, that the cannabis plants will not test above the acceptable hemp THC level of 0.3 percent on a dry weight basis.

5. Regardless of the specific performance-based sampling requirements developed under a State or Tribal plan, all samples must be collected from the flowering tops of the plant by cutting the top five to eight inches from the "main stem" (that includes the leaves and flowers), "terminal bud" (that occurs at the end of a stem), "or "central cola" (cut stem that could develop into a bud) of the flowering top of the plant.

6. States and Tribes are required to include performance-based sampling protocols in the plan submitted to USDA for approval if they decide to use this methodology.

Standard Sampling Protocols:

1. The standard sampling method must be used by all producers, except for producers operating under a State or Tribal plan that includes a performance-based sampling requirement.

2. The standard sampling protocol ensures, at a confidence level of 95 percent, that no more than one percent of the plants in each lot would exceed the acceptable hemp THC level and ensures that a collected sample represents a homogeneous composition of the lot.

3. Every lot and every producer must be sampled and tested.

4. All samples must be collected from the flowering tops of the plant by cutting the top five to eight inches from the “main stem” (that includes the leaves and flowers), “terminal bud” (that occurs at the end of a stem), ”or “central cola” (cut stem that could develop into a bud) of the flowering top of the plant.

5. All producers licensed directly by USDA are subject to these requirements.

Equipment and Supplies:

1. Garden pruners/shears (Cleaned prior to and following each composite sample. Some examples of appropriate cleaning agents and supplies to use on garden pruners/shears are bleach, rubbing alcohol, steel wool, and/or sandpaper.)

2. Sample bags, paper.

2.1. The size of the bags will depend upon the number of clippings collected per lot.

2.2 The bags should be made from material known to be free from THC.

3. Security tape

4. Permanent markers

5. Sample collection forms

6. GPS Unit of lot being sampled

7. Disposable gloves – Nitrile

8. Ladder

Sampling Guidelines:

1. The licensee or designated employee should be present throughout the sampling process, if possible.

2. Surveillance of the growing area.

2.1. The sampling agent should estimate the average height, appearance, approximate density, condition of the plants, and degree of maturity of the inflorescences (flowers/buds).

2.2. The sampling agent should visually establish the homogeneity of the stand to establish that the growing area is of like variety.

3.Time of Sampling:

3.1. Within 30 days prior to the anticipated harvest of a designated hemp lot, an approved sampling agent, State or Tribally designated person or Federal, State, local, or Tribal law enforcement agency shall collect representative samples from such cannabis plants for THC concentration level testing.

4. Field Sampling:

4.1. The licensee or designated employee should accompany the sampling agent throughout the sampling process, if possible.

5. Surveillance of the growing area.

5.1 The sampling agent should verify the GPS coordinates of the growing area as compared with the GPS coordinates submitted by the licensee to USDA.

5.2 The sampling agent should estimate the average height, appearance, approximate density, condition of the plants, and degree of maturity of the inflorescences (flowers/buds).

5.3 The sampling agent should visually establish the homogeneity of the stand to establish that the growing area is of like variety.

6. Time of Sampling:

6.1 Within 30 days prior to the anticipated harvest of a lot a sampling agent should collect representative samples from such a lot for THC concentration level testing.

7. Field Sampling:

7.1 For purposes of determining the number of individual plants to select for sampling, the size of the growing area should be considered. For sampling purposes, samples from separate lots must be kept separate and not be comingled.

7.2 For lots of less than one acre, including greenhouses, select a minimum of 1 plant, then take a cutting from the plant to form a sample. For lots of 1 to 10 acres, including greenhouses, follow the chart in example 2 below, take cuttings of each plant, then combine to form a composite sample.

7.3 For growing areas larger than ten (10) acres, including greenhouses, the number of plants that should be selected to form a composite sample is based upon the Codex Alimentarius Recommended Methods of Sampling for the Determination of Pesticide Residues for Compliance with MRLS CAC/GL 33-1999.

7.4 The sample size is estimated in a two-step process. The first step is to estimate the number of primary plants to be sampled. The second step is to adjust the estimate of primary plants by the acreage under cultivation.

The initial number of primary plants is estimated using:

$$n_o = \frac{\ln(1-p)}{\ln(1-i)}$$

where p is the confidence level to detect hemp plants testing above the acceptable THC threshold and i is the proportion of hemp plants having THC content above the acceptable threshold. The values for i are based on past experience in the same or similar growing areas, and should be consistent with the requirements currently in the Final Rule.

The initial primary plants estimate is adjusted by the number of acres to calculate the minimum number of primary plants as follows:

$$n = \frac{n_o}{1 + \frac{(n_o - 1)}{N}}$$

where n is the minimum number of primary plants to be selected for forming a composite sample, n_o is the initial number of primary plants estimated using the previous formula, and N is the number of acres under cultivation.

Examples 1 and 2 below describe the minimum number of samples that must be collected in order to meet the 95% confidence level requirements in the Final Rule. If a State or Tribal hemp program does not have data from a prior growing season to determine the i value, the sampling charts below may be utilized. State and Tribal hemp programs are free to include more rigorous sampling requirements, or to develop performance based requirements.

Example 1: The initial primary plant sample size is 299 with a confidence level of 95% to detect hemp plants having an acceptable hemp THC level and a proportion of hemp plants having THC content above the acceptable threshold equal to 0.01 is considered appropriate. The adjusted primary plant sample sizes for fields from 11 to 173 acres in size are shown in the following table:

Number of acres	Sample Size	Number of acres	Sample Size	Number of acres	Sample Size	Number of acres	Sample Size
11	11	40	36	75-76	61	119-120	86
12	12	41-42	37	77	62	121-122	87
13	13	43	38	78-79	63	123-124	88
14	14	44	39	80-81	64	125-126	89
15	15	45-46	40	82	65	127-128	90
16	16	47	41	83-84	66	129-130	91
17	17	48	42	85-86	67	131-132	92
18-19	18	49-50	43	87	68	133-134	93
20	19	51	44	88-89	69	135-136	94
21	20	52	45	90-91	70	137-138	95
22	21	53-54	46	92	71	139-140	96
23	22	55	47	93-94	72	141-143	97
24	23	56	48	95-96	73	144-145	98
25-26	24	57-58	49	97-98	74	146-147	99
27	25	59	50	99	75	148-149	100
28	26	60-61	51	100-101	76	150-152	101
29	27	62	52	102-103	77	153-154	102
30	28	63-64	53	104-105	78	155-156	103
31-32	29	65	54	106-107	79	157-157	104
33	30	66-67	55	108	80	159-161	105
34	31	68	56	109-110	81	162-163	106
35	32	69-70	57	111-112	82	164-166	107
36	33	71	58	113-114	83	167-168	108
37-38	34	72-73	59	115-116	84	169-170	109
39	35	74	60	117-118	85	171-173	110

Example 2: The adjusted primary plant sample sizes for fields from less than 1 to 10 acres in size are shown in the following table:

Number of acres	Sample Size
Less than 1	1
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10

7.5 Sampling agents should always walk at right angles to the rows of plants if possible, beginning at one point of the lot and walking towards another point on the opposite side of the lot. If the lot is too dense for this to be possible, the sampling agent should take all reasonable steps to ensure that a sample is collected that represents a homogeneous composition of the lot by avoiding edges and thoroughfares.

7.6 While walking through the growing area, the sampling agent should cut at least “n” inflorescences (the flower or bud of a plant) based on the acreage of the growing area , at random but convenient distances. Avoid collecting sample specimens from the borders of the field/greenhouse.

7.7 The cut should be obtained from the flowering tops of plants when flowering tops are present, and shall be approximately five to eight inches in length from the “main stem” (that includes the leaves and flowers), “terminal bud” (that occurs at the end of a stem), or “central cola” (cut stem that develops into a bud) of the flowering top of the plant.

7.8. Utilize paper sample bag(s) for collecting sample cuttings. Ensure that each bag has the minimum number of cuttings, n, as calculated by 7.4, or in the Example Tables 1 and 2. If one bag cannot accommodate the minimum number of cuttings due to lot size, the sample may be divided into multiple bags, but must be clearly labeled in such a way that each bag is appropriately matched with the corresponding lot. (i.e. For lot 101 with three corresponding sample bags: 101 1 of 3, 101 2 of 3, 101 3 of 3.)

7.9. Seal each bag and record the sample number or other documentation as required by the State or Tribe.

7.10 A sampling protocol must have the potential to ensure, at a confidence level of 95 percent, that the cannabis plants will not test above the acceptable hemp THC level of 0.3 percent on a dry weight basis.

8.Sample identification:

8.1 The sampling agent should seal each bag and record the sample identification number. The sample should also be identified with the following information: Sampling agent contact information; name and contact information of the producer; producer hemp license or authorization number; date of sample; and lot, subfield, or other identifier as provided by the USDA Farm Service Agency; any other information that may be required by States, Tribes, Law Enforcement Authorities, mail delivery services, Customers or groups of customers.

Note: In accordance with 7 CFR 1.901(e), the contents of this document does not have the force and effect of law and are not meant to bind the public in any way, and the document is intended only to provide clarity to the public regarding existing requirements under the law or agency policies.