Some Background on Hemp Botany and Pollination (Feb 23, 2015)

Russ Karow, Professor Emeritus, OSU Crop and Soil Science

The hemp plant (*Cannabis sativa* L.) is a herbaceous annual belonging to the family Cannabinaceae. As the plants mature a rigid, woody stem develops ranging in height from 3 to 19 feet. Uncrowded plants have many spreading branches, and the central stalk can grow 1-2 inches in diameter. When grown in thick stands, hemp stems are unbranched and without foliage except near the top and range from 1/4 - 3/4 inch in diameter. Stems of most varieties are hollow. Leaves are hand-shaped (palmately compound) with 5 - 11 pointed, serrated leaflets 2 - 6 inches long and 3/8 - 3/4 inch wide. In light, well-drained soils primary hemp roots can reach depths of 6.5 - 8 feet and secondary root branches may grow 2 - 2.5 feet below the soil surface. (from *Feasibility of Industrial Hemp Production in the United States Pacific Northwest*, OSU SB 681, May 1998, Daryl T. Ehrensing)

Hemp normally is dioecious having both male (staminate) and female (pistillate) plants, each with distinctive growth characteristics. Male plants are tall and slender with few leaves surrounding the flowers, while female plants are short and stocky with many leaves at each terminal inflorescence. Male plants die (senesce) soon after their pollen is shed, while female plants remain alive until the seeds mature. Relatively stable monoecious varieties – plants with both male and female flowers - have been developed through breeding and selection. (from *Feasibility of Industrial Hemp Production in the United States Pacific Northwest*)

Cannabis pollination can occur through both wind and insect mediated pollen transfer. Bosca and Karus (The cultivation of hemp - Botany, Varieties, Cultivation and Harvesting. Hemptech, Sebastopol, CA. 23.1998) concluded that pollen can travel as far as 7.4 miles (12 km) and reach altitudes of 66 – 98 feet (20-30 meters). Honey bees are known to travel at least 2.5 miles from their hives. For crop pollens in general, 10-15 yards is most commonly cited as the distance to which pollen will be dispersed by wind. The amount of wind-carried pollen decreases with distance from the source. Draft seed certification standards for the state of Oregon are shown on the reverse side of this page. The isolation distances shown (1-3 miles depending on class of seed) are drawn from hemp regulations in Canada and Europe. The standards have not yet been approved by the OSU Seed Certification Board.

For decades, specialty seed growers in the Willamette Valley have used a pinning system to maintain desired isolation distances among their array of wind and insect pollinated crops. The system works well as long as all those interested in growing crops with potential pollination conflicts participate, “play” by the rules established for pinning, and that adequate spatial separation is possible within the confines of the land base available to pinning system program participants.

Oregon Seed Certification Service
http://seedcert.oregonstate.edu

CERTIFICATION STANDARDS
INDUSTRIAL HEMP
(*Cannabis sativa* L.)
GLAC Proposal - December 2014

Certification Standards: The general standards for seed certification found in the Oregon Seed Certification Service (OSCS) Handbook are basic to all crops and, together with the following specific regulations, constitute the certified Industrial Hemp standards.

Varieties Certified: Only varieties approved for production by Federal or local regulatory authorities may be eligible for seed certification. Varieties may represent the following types[1]: Monoecious, with male and female flowers on the same plant; Dioecious, with male and female flowers on separate plants; and (unisexual female) Hybrids, with sterile male and fertile female flowers on the same plant.

Field History: To produce Foundation and Registered seed, land must not have grown or been seeded to Hemp during the previous five years, for Certified seed three years, unless the previous crop was of the same variety and certified. Hemp must be planted in distinct rows. OSCS must approve exceptions prior to planting.

Field Inspections: Three inspections may be required depending on the variety type and production generation; at least two inspections are required prior to seed harvest. The first inspection occurs before female (pistillate) flowers of the crop are receptive and after the formation of male (staminate) flowers, preferably before pollen is shed; the second inspection occurs during the receptive stage of female plants, normally within 3 weeks after first inspection; the third inspection occurs when off-type female flowers can be identified. The field application must be submitted within 60 days of planting, and a seed crop application must be submitted by April 15 of each year in which seed is produced.

Field Standards:

Class of Seed Produced	Variety Type	Maximum Number Of "Too Male" Monoecious Plants[2]	Maximum Number Of Dioecious Male Plants Shedding Pollen[2,3]	Maximum Number Of Other Impurities[2]	Number Of Inspections	Isolation Distance Required	
						From Different Varieties Or Types	From Lower Certified Class Of Same Variety
Foundation[4]	Monoecious	500	1	3	3	3 miles	2 miles
	Dioecious	--	--	3	3		
Registered[4]	Monoecious	1000 (10%)	2	10	3	3 miles	1 mile
	Dioecious	--	--	10	2		
Certified[4]	Monoecious	--	100	10	2	1 mile	--
	Dioecious	--	--	10	2		
	Hybrid	--	100	10	2		

Seed Standards: (Minimum Sample Size – 1 Pound)

Factor	Foundation (White tag)	Registered (Purple tag)	Certified (Blue tag)
Pure seed, minimum	98.00%	98.00%	98.00%
Other crops, maximum	0.10%	0.25%	0.50%
Inert matter, maximum	2.00%	2.00%	2.00%
Weed seed[5], maximum	0.10%	0.10%	0.25%
Germination	85%	85%	85%

Special note: Growers may be required by Federal or local regulations to obtain THC test results from a recognized laboratory verifying that the THC content of their Industrial Hemp crop complies with applicable regulations. Growers may be required to submit these results to OSCS to complete seed certification.

[1] Although traditionally a crop with a Dioecious plant type, many Monoecious varieties of hemp have been developed. Hemp is sexually polymorphic and often produces many different ratios of intersexual plant types that can increase rogueing requirements. Variety descriptions normally define these ratios.
[2] Maximum impurities allowed per 10,000 plants; applied as an average of six counts involving at least 10,000 plants each. Includes off-types or other varieties.
[3] If Dioecious male plants start flowering before removal from field, all plants around them should be destroyed for a radius of 10 feet for Foundation and 7 feet for Registered seed crops.
[4] An OSU Seed Lab Orobanche exam is required if Small broomrape is found in a certification field inspection. Two samples are to be submitted in separate containers: one for the Orobanche exam, the other for standard purity and viability testing.
[5] None of the prohibited weeds listed in section V in the OSCS Handbook, nor any docks, sheep sorrel or St. Johnswort allowed in any class of seed.