Small-scale Coriander Production in Interior Alaska

AFES MP 2014-08 • a report by Patricia S. Holloway, Grant E.M. Matheke, and Katie Kokx (undergraduate intern)

Coriander (*Coriandrum sativum* L.) is a spice that is used widely in Asian, Middle Eastern, North African, Mexican, and South American cuisines. It is grown and harvested commercially in many parts of the world including Russia, central Europe, the Mediterranean region, Canada, Mexico, and South America (Lopez *et al.* 2008). In Alaska, it has been grown for many years, but not often as a seed crop. The leaves of the coriander plant are harvested as the culinary herb cilantro.

Cilantro grows well in Alaska and is used extensively in Indian, Asian, and Mexican cuisines. The plants bolt (produce flower stalks) early, so the harvest season for the leaves is very short. If cilantro is not removed from the garden after bolting, coriander seeds will be produced and eventually self sow in gardens (Barbara Fay, 2012 pers. comm.). A local gourmet food company contacted us to learn if it was possible to grow commercial quantities of coriander seed in Alaska to help them produce an all-Alaska product.

Cultivars of coriander grown as cilantro easily self sow in Alaska gardens, but they do not yield large quantities of seeds every year. The essential oils in the seeds (mainly linalool [Diederichsen 1996]) from cilantro cultivars are not the best quality. Coriander grown for the seeds is difficult to find commercially. In 2009, we contacted Dr. Mark Widrlechner, USDA Plant Introduction Station, Ames, Iowa, then manager of the national collection of coriander (now retired). He suggested several strains and cultivars that might be useful from the USDA collections (Table 1). Our objective was to examine the yield of small plots of coriander to learn if sufficient quantities of seed could be harvested for local use.

Methods

Trials for yield of coriander seed were conducted in 2009 and 2010. We seeded coriander in the greenhouse on May 1, one month prior to June 1, the average date of last spring frost. Research plots at the UAF Georgeson Botanical Garden were tilled, and the Fairbanks silt-loam soils were fertilized with 10-20-20 S (approx. 6% sulfur) at a rate of 4lb/100ft^2 (1.8 kg/ 30 m^2). Seedlings were transplanted in single rows centered on a three-foot-wide (0.9 m) mulch of IRT (infrared transmitting) plastic. Plant spacing was eight inches between plants and five feet (1.5 m) between rows.

Seven coriander cultivars were planted using a randomized complete block design with four replicates and three plants per replicate plot. Plants were drip irrigated as needed throughout the season. We harvested the seeds in mid-September when the umbel seed heads became brown, and some seeds had begun to disperse naturally (Sept. 14, 2009, Sept. 13, 2010). Whole plants were placed in paper bags and air-dried at room temperature, and seeds/fruits with their husks were allowed to drop naturally into the bags. All fruits were hand rubbed from the dried stems, separated from leaves and stems by sieving and air blowing, then bagged and weighed after two months' drying time.

Results

All cultivars produced abundant fruits/seeds, and there was no significant difference in yield among cultivars in 2009 and 2010 (Table 2). Although there was too much variability in replicate yields of each cultivar to distinguish statistical differences among cultivars, 'ISN 187' and 'CDC Minor' were among the highest-yielding cultivars both years. CDC Minor and CDC Major are the most important cultivars grown in Canada (Risula *et al.* 2008).

Harvesting is a challenge. The flowering head is an umbel with the peripheral flowers blooming first and opening later toward the center. In our trials the fruits matured over an extended period, especially in cool, wet weather. Coriander "seed" is a two-seeded fruit with a hard, nut-like covering. Commercial harvesters warn that damage

Front cover image: Coriander in bloom at test plots at the Georgeson Botanical Garden. Photo courtesy Patricia S. Holloway.

Table 1. Coriander (*Coriandrum sativum*) cultivars from North Central Regional Plant Introduction Station, Iowa State University, Ames, Iowa.

NCRPIS ID. #	Cultivar	Origin
PI 633685	CDC Major	Saskatchewan, Canada
PI 633686	CDC Minor	Saskatchewan, Canada
Ames 25168	C094INC 1105	Iowa, United States
Ames 24907	ISN 187	Plovdiv, Bulgaria
PI 502320	AR-235	Uzbekistan
Ames 18593	901015	England, United Kingdom
Ames 13900	USSR 90-08-08	Tajikistan

Coriander in the form of the dried husks of the fruits. There are two seeds per fruit. Wikipedia photo by Bierfaß. Creative Commons Attribution-Share Alike 3.0 Unported license.

Table 2. Yield of coriander (*Coriandrum sativum*) cultivars.

		Yield dry wt.						Yield dry wt.			
Year	**Cultivar**	**g/plot**	**g/m**	**lb/ft**		**Year**	**Cultivar**	**g/plot**	**g/m**	**lb/ft**	
2009	ISN 187	219	359	0.24	NS*	2010	ISN 187	121	198	0.13	NS
2009	CDC Minor	206	338	0.23	NS	2010	CDC Major	110	180	0.12	NS
2009	AR-235	196	322	0.22	NS	2010	CDC Minor	96	157	0.11	NS
2009	901015	168	276	0.19	NS	2010	C094INC-1105	88	144	0.10	NS
2009	CDC Major	143	235	0.16	NS	2010	901015	83	136	0.09	NS
2009	USSR 90-08-08	114	187	0.13	NS	2010	AR-235	82	135	0.09	NS
2009	C094INC-1105	105	172	0.12	NS	2010	USSR 90-08-08	75	123	0.08	NS

**There were no significant differences among cultivar yields (Randomized Complete Block Design ANOVA P=0.05)*

to the outer fruit covering allows the volatile essential oils to escape, thus reducing the quality of the commercial product. Coriander with 5 percent or more damaged fruit is usually rejected by buyers (Risula *et al.* 2008). Harvested fruits must also be dried thoroughly to avoid surface mold.

In our experiment, hand harvesting and cleaning were tedious and difficult. While a few fruits separated quite easily, most remained attached to the umbel and required significant cleaning by rubbing against a screen or hand rubbing to remove accessory plant parts. Commercially, the crop is combined, swathed, cleaned, and dried using large-scale agronomic field equipment. Investment in equipment for large-scale production probably would not be feasible in Alaska.

Small-scale coriander seed production is feasible in Fairbanks, Alaska. Our trials cannot be compared with large agricultural field production, but the quantities we harvested were adequate to supply the current small demand for the local gourmet food market.

Botanical drawing of Coriandrum sativum *L. from* Köhler's Medicinal Plants, *by Franz Eugen Köhler, published 1897.*

References and Further Reading

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Coriander sativum *L. flower. Photo taken by H. Zell at the Botanical Garden KIT in Karlsruhe, Germany. Creative Commons Attribution Share Alike 3.0 License.*

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About the Alaska Agricultural & Forestry Experiment Station

The federal Hatch Act of 1887 authorized establishment of agricultural experiment stations in the U.S. and its territories to provide science-based research information to farmers. There are agricultural experiment stations in each of the 50 states, Puerto Rico, and Guam. All but one are part of the land-grant college system. The Morrill Act established the land grant colleges in 1862. While the experiment stations perform agricultural research, the land-grant colleges provide education in the science and economics of agriculture.

The Alaska Agricultural Experiment Station was not originally part of the Alaska land grant college system. In 1898, the station was established in Sitka, also the site of Alaska's first experiment farm. Subsequent branches were opened at Kodiak, Kenai, Rampart, Copper Center, Fairbanks, and Matanuska. The latter two remain as the Fairbanks Experiment Farm and the Matanuska Experiment Farm. The USDA established the Fairbanks experiment station in 1906 on a site that in 1915 provided land for a college. The land transfer and money to establish the Alaska Agricultural College and School of Mines was approved by the U.S. Congress in 1915. Two years later the Alaska Territorial Legislature added funding, and in 1922, when the first building was constructed, the college opened its doors to students. The first student graduated in 1923. In 1931, the experiment station was transferred from federal ownership to the college, and in 1935 the college was renamed the University of Alaska. When campuses were opened at other locations, the Fairbanks campus became the University of Alaska Fairbanks.

Early experiment station researchers developed adapted cultivars of grains, grasses, potatoes, and berries, and introduced many vegetable cultivars appropriate to Alaska. Poultry and other animal management was also important. This work continues, as does research in soils and revegetation, forest ecology and management, and rural and economic development. As the state faces new challenges in agriculture and resources management, the Agricultural and Forestry Experiment Station continues to bring state-of-the-art research information to the people of Alaska.

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