

Chinese Kale Seed

Brassica oleracea var. *albonglabra* (Cruciferae)

Fast Facts:

Acres in Washington: less than 100
Per Acre Value: \$1,000-\$1,200
Value of Production in Washington: \$100,000-\$120,000
Number of Growers: 5 to 10

Description of crop:

Most, if not all, U.S. Chinese kale seed production is located in Washington. Chinese kale seed is a direct-seeded annual that is planted in March or April and harvested in August or September. The crop is hand-hoed to remove weeds and rogued to remove plants not displaying true varietal characteristics. At harvest, the crop is cut, windrowed and dried in the field for 10 to 14 days. After drying, the crop is threshed and the seed is sent to a conditioning plant, where it is cleaned to 99% purity.

Key pests:

In eastern Washington, cabbage maggot is the most severe pest. Other insect pests include sugarbeet leafhopper, cabbage aphid, turnip aphid, loopers and cutworms. Weed pests include nightshades, pigweeds, lambsquarter, wild buckwheat, volunteer crops, foxtail and barnyard grass. White mold (*Sclerotinia sclerotiorum*) is the main disease of concern in eastern Washington. Pest problems in western Washington are more extensive. Cabbage aphid, turnip aphid, seedpod weevil and cabbage maggot are severe pests. Other insect pests include cabbage looper, springtails, webworms, diamondback moth, cutworms, symphylans and wireworms. Weed pests include shepherdspurse, mustards, lambsquarter, pigweeds, smartweed, henbit, groundsel, chickweed, wild turnip, quackgrass, wildoat, Canada thistle, bolt thistle, vetch, nightshades and bed straw. Shepherdspurse, groundsel and henbit are the more problematic weeds. Weeds are serious pests due to two issues. The seeds that the weeds produce are often very difficult to sort out of the seed crop. If the contaminating seeds are too costly or impossible to sort out, the seed crop is considerably lowered in value or rendered unmarketable. Weeds also serve as a host for insects and diseases. The most important diseases are powdery mildew, downy mildew, black rot (*Xanthomonas campestris* pv. *campestris* and *X. campestris* pv. *armoraciae*), black leg (*Phoma lingam*), Alternaria black spot and white mold (*Sclerotinia sclerotiorum*). Bacterial soft rot of the heads and gray mold (*Botrytis cinerea*) can occur in spring following winter injury. Club root (*Plasmodiophora brassicae*) can be an occasional problem. Ring spot (*Mycosphaerella brassicicola*) occurs every winter/spring but is seldom of economic significance. Black rot and black leg are of quarantine significance and largely managed by strict screening of stock seed lots so that only non-infected stock seed is planted.

Key pesticides:

In eastern Washington, Orthene, malathion and diazinon control aphids. Cabbage maggot is controlled with Lorsban before planting, and sugar beet leafhopper is controlled with Asana. In western Washington, Lorsban and Pounce/Ambush are used for insect control, and endosulfan is applied mid-bloom to control seedpod weevil, cabbage maggot, cutworms and loopers. Treflan is used as a pre-plant incorporated to control broadleaf weeds, and Fusilade is applied occasionally after harvest to control grasses. Hand-hoeing supplements weed control. Cultural practices such as extending the rotation period to 3 to 5 years helps reduce inoculum levels of pathogens in the soil, particularly to manage *Alternaria* black spot, white mold, club root, and other diseases in western Washington. Stock seed is treated with mefenoxam, thiram, and sometimes fludioxonil to control seedling blights. The loss of benomyl as a seed treatment in 2006 created significant concern about black leg becoming established in the seed production area again as benomyl seed treatment largely eradicated the problem from the cabbage seed industry. Thiabendazole has proved an effective alternative so an emergency seed *Alternaria* black spot and white mold. Boscalid and cyprodinil + fludioxonil are also used for white mold and gray mold (for the latter, in spring following any winter injury, for the former, starting at early petal fall). Mefenoxam, metalaxyl, and cymoxanil control downy mildew. Azoxystrobin and pyraclostrobin are used to control powdery mildews, *Alternaria* black spot and white mold. Mancozeb and chlorothalonil are used for general disease control. Due to over-wintering damage, copper hydroxide is usually applied in late winter or early spring to control bacterial soft rots. Copper hydroxide is applied to control bacterial soft rots and with mancozeb to help prevent black rot. Black-rot infected crops or seed lots are destroyed to prevent spread of the disease. The black rot bacterium can be spread by water, insects, equipment and animals. It persists in infected plant debris for up to two years and in the soil for months.

Critical pest control issues:

The loss of dimethoate was significant. Mitigation to comply with urbanization, salmon and water buffer issues are expensive. Efficacious herbicides are critical for seed production. Weeds not only compete with the seed crop but act as host for insects and diseases. If weed seeds cannot be easily sorted out from the seed crop, they will cause the value of the seed crop to drop or even cause the crop to be unmarketable. The loss of benomyl as a seed treatment in 2006 created significant concern about black leg becoming established in the seed production area again as benomyl seed treatment largely eradicated the problem from the cabbage seed industry. Finding more effective alternatives than copper hydroxide for control of black rot is a high priority need for cabbage seed production.

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Location

of production: Chinese kale seed is grown in Grant, Adams, Skagit and Whatcom Counties.



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Chinese Kale Seed Production in Washington State

