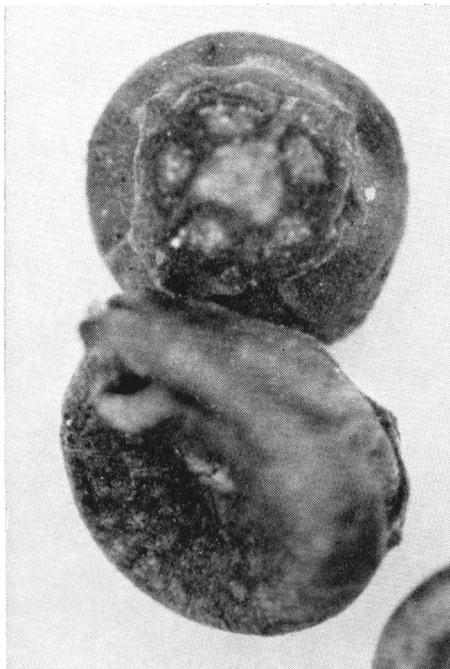


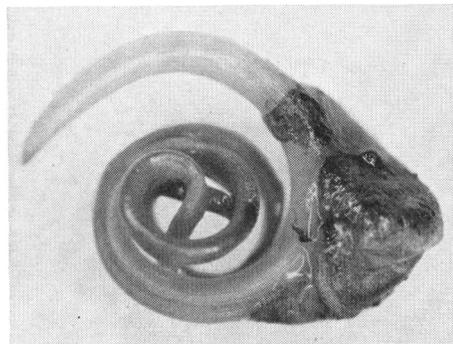
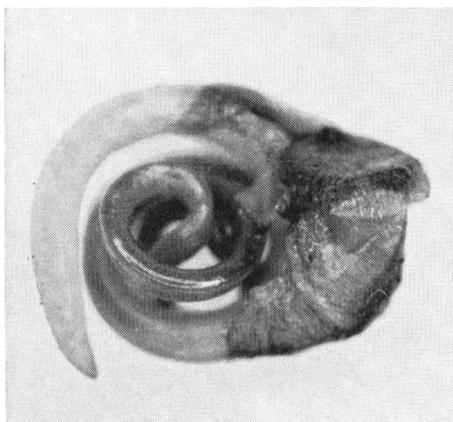
Germination of

RUSSIAN THISTLE SEEDS

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Russian thistle seeds at the time of water addition, top photo (seed size was 1.0 to 1.3 mm)—one seed 38 minutes after water addition, middle photo—and 61 minutes after water addition, lower photo (and cover).



Russian thistle seeds are remarkably adapted for survival of the species under semiarid conditions, but they do not survive on undisturbed soils.

THE TUMBLEWEED, *Salsola kali*, commonly known as Russian thistle, is an introduced species in the United States. As a pest, it causes fire hazards, obstructs roads and streams, and is a host plant for insects and curly-top virus involving many crops. It grows extremely well under semiarid conditions. In dust bowl days in the Midwest during the 1930's, when there was insufficient rainfall for regular crops, farmers harvested Russian thistle as a forage crop. Russian thistle needs only one-third to one-half of the water required to produce a dry-matter unit as does alfalfa.

Russian thistle seeds contain no endosperm. They have a spiral embryo which contains some chlorophyll in the seed stage. At temperatures above about 52°F the seeds germinate when in contact with moderately moist soil. Some other species do germinate at lower soil moisture, however.

At temperatures above about 80°F the seeds germinate literally in a matter of minutes, if sufficient moisture is present. Germination consists of unwinding of the spiral embryo and also of elongation of the cells of both the embryo and the root (radicle). The spiral action of the un-

winding embryo forces the root into soil if the soil is loose and pliable. These characteristics allow successful germination of the thistle seed with very small amounts of water.

Tests with sufficient gamma irradiation to stop cell division but not enough to stop germination suggest that germination is wholly a matter of rapid cell elongation when sufficient moisture is present at a proper temperature. Russian thistle does not grow on undisturbed natural terrain. Seeds germinating on the surface of hard soil dehydrate and die because their roots cannot penetrate such a surface. For this reason Russian thistle is not seen on deserts unless the soil has been disturbed. On disturbed desert soils, it grows extremely well under the limiting moisture conditions which prevail.

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