The Occurrence of Blanks in the Filbert Corylus avellana L. and Possible Causes

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The problem of seedless nuts, or "blanks," is common to the filbert wherever it is grown. To the commercial grower, it represents a serious economic loss. The cause of blanks is unknown. Suspected causes for blanks are cytomixis during megasporogenesis, genetic incompatibility between pollenizer and main-crop cultivars, self-pollination, aneuploidy, lack of double fertilization, embryo abortion, seasonal variation, and cultural practice.

THE PROBLEM

A seedless nut can be of great scientific interest, but to the nut grower it is the epitome of uselessness; indeed, it represents both a nuisance and an economic loss. A seedless nut—that is, one without a kernel—is known as a "blank" in filberts.

The occurrence of blanks is universal wherever filberts are grown and whatever filbert cultivar is being considered. For a given cultivar, the percentage of blanks in the crop varies from year to year, running as high as 25%. Compared to the potential yield, this is a considerable loss for the grower to sustain. These blanks represent extra handling during harvest; cleaning equipment must remove them before delivery to packers, or the grower will be penalized for their presence.

Literature as early as 1844 (Danielsson-Santesson, 1951) referred to filbert blanks. The external appearance of a blank is similar to that of a sound nut. Internally, the blank has either two underdeveloped ovules at the apex of the vascular strand (Fig. 1) or a partly developed kernel (Fig. 2). The former condition results from a lack of fertilization; the latter, embryo abortion (Trotter, 1948).

A preharvest drop of blank nuts usually occurs in early August. These nuts are mostly singles and doubles, since larger clusters that have one or more sound kernels do not drop. Apparently the fertilized, developing ovary of sound nuts contributes a stimulus that prevents abscission of the cluster. The blank drop is a nuisance to the grower as he must eliminate them by flail mowing or tillage prior to harvest. Blank nuts drop from the tree by formation of an abscission layer at the base of the pedicel. Blanks in clusters with sound nuts remain in the husk and drop with the sound nuts at harvest time (Painter, 1960). These blanks are mechanically picked up along with good nuts and must then be separated from them. This separation is usually accomplished by a suction fan which also eliminates leaves. Following field cleaning, the nuts are given a second cleaning, usually at the packing plant. Larger growers have their own cleaning equipment so as to deliver a higher percentage of sound nuts to the packer.

The reduction or elimination of blanks in filberts would be of great economic benefit not only by increasing yields, but by reducing the extra handling that they require. Using the figure of 10% blanks for the 1974 world crop of 382,000 tons of filberts, the potential crop could have been 424,444 tons. The 10% figure would amount to 42,444 tons which at a grower price of $600.00 per ton would represent a loss of $25,466,400.

The exact cause of blanks is not yet known, but several suggestions have been proposed as reasons.

Cytomixis

Woodworth (1929) has shown that the genus Corylus is subject to a high degree of chromosomal aberration during microsporogenesis. He observed cytomixis, or ex-
change of chromosomes and chromosome material, by means of cytoplasmic connections between cells. Having erroneously reported the haploid number of chromosomes to be 14, Woodworth believed that the existence of fewer chromosomes was caused by nondisjunction. The correct haploid chromosome number for Corylus is 11 (Danielsson, 1946; Jaretzky, 1930; Kasapligil, 1968). Danielsson-Santesson (1951) found no irregu-

Fig. 1. Typical filbert blank. Ovules present, but no enlargement.

Fig. 2. Filbert blank. One ovule, partly enlarged before development was arrested.