Pollen tube growth in Nonpareil almond in relation to pollen genotype, temperature and competition among mixed pollen

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Pollen tube growth in Nonpareil almond cultivar was studied in three different temperature regimes (22·c, 15·c and field). Pollen tube growth was examined by light microscopy after 6, 12, 24, 48, 72, 96, and 144 hours after hand cross pollination with two cross-compatible cultivars, namely Keane and Peerless. Additionally, embryos resulting from fertilization by a mixture of pollen from the two above sources were examined using isozyme analysis to estimate the frequency of particular pollen genes in the embryos.

Pollen germination on the stigma surface was found to be related to temperature, and germination began 6 hours after pollination. Pollen tube penetration in upper part of the style began for Peerless pollen after 12 hours at 22·c only, and after 24 hours for the other temperatures. There was no significant difference between the number of pollen tubes observed for all temperatures at days 2, 3, 4 and 6. Pollen tubes were observed at the base of the style after three days for Peerless at 22· c, and after four days for other temperatures. The pollen tube in the micropyle was observed after 4 days in all treatments, except for Keane at 15·c which did not enter the micropile until after 6 days. The percentage of pollen tubes in the ovule in the field conditions was always higher than that in the controlled growth room experiments at 22·c and 15·c respectively.

Competition between Keane and Peerless pollen when appplied together on Nonpareil stigmas was investigated by observations on pollen genes in the resultant embryos. Comparison of 5 different isozyme loci showed that the frequency of pollen genes in the embryo was higher for Peerless, being twice that for Keane genes. Self-pollination of Nonpareil resulted in the pollen tube being rejected on the stigma as well as in the style; swelling at the tip of the tube and also branching of the pollen tube was only rarely observed. Deposition of callose on the tip without swelling was found to be a common indication of incompatible pollen.