

Pollination and Fruit Set of 'Magness' Pear

T. VAN DER ZWET, H. L. KEIL, AND W. A. OITTO¹

'Magness', a new pear cultivar, was planted to considerable acreage soon after its introduction in 1960 (1). This cultivar is moderately resistant to fire blight (*Erwinia amylovora*) and the fruit has excellent quality. However, the commercial value of this cultivar is questionable because of low yields, which in some years are too small to warrant commercial harvest (2). On the other hand, some 'Magness' trees

consistently produce good crops. In Texas, Stump (5) obtained high yields by hand pollinating flowers on 4-year-old trees. In 1971, moderate crops were observed in large 'Magness' orchards in Spartanburg County, South Carolina. On several trees in one orchard, limbs had been broken by an extremely heavy crop.

'Magness' is a vigorously growing cultivar, but its flowers are small and unattractive to bees, and produce no pollen. Thus, this cultivar cannot be self fertilized or serve as a pollinizer. The sugar content of its nectar, like that of most other pear cultivars, is low. Unlike some of the major pear cultivars, 'Magness' does not set fruit parthenocarpically in areas where it is now grown. In addition, a serious bud blast was observed on 'Magness' trees at Beltsville, which destroyed about three-fourths of the flower buds during the cool wet spring of 1968 (4). These characteristics probably play a role in its failure to set a heavy crop. Therefore, the ability of 'Magness' trees to develop flower buds and to set fruit was studied.

RESULTS

Pollinations: During the past 6 years, 'Magness' was used extensively in the Beltsville breeding program. A large number of hand pollinations were made on flowers of this cultivar. Fruit set resulting from these controlled pollinations was compared with those on other pear cultivars. Most cultivars used as a pollen source effectively fertilized 'Magness' flowers (Table 1). Fertilization ranged from

Table 1. Effectiveness of pollen from various pear cultivars in fertilizing flowers of 'Magness' compared to 'Moonglow', 'Bartlett', and 'Kieffer' crosses.

Progeny parentage	No. flowers pollinated	% flowers fertilized ¹	No. seed/fruit
Magness x			
Bradford	84	41.7	8.1
Dabney	327	26.4	1.9
Dawn	253	28.5	4.7
Ewart	309	54.4	1.3
Gorham	563	19.2	2.9
Kieffer	26	57.7	5.1
Maxine	77	37.7	3.7
Moonglow	123	39.0	6.3
Morgan	325	13.5	2.5
Old Home	310	37.7	3.8
Other cultivars	1,220	31.3	3.0
U.S. selections	5,194	20.3	2.9
Total	8,813	24.0	4.3
Moonglow x			
several cultivars	4,098	15.3	3.8
Bartlett x			
several cultivars	2,756	16.5	3.2
Kieffer x			
several cultivars	5,421	29.6	7.6

¹determined by the number of fruit collected.

¹Research Plant Pathologists, Fruit Laboratory, Agricultural Research Service, Beltsville, Maryland 20705; and Horticulturist, Ohio Agricultural Research & Development Center, Wooster, Ohio 44691, respectively.

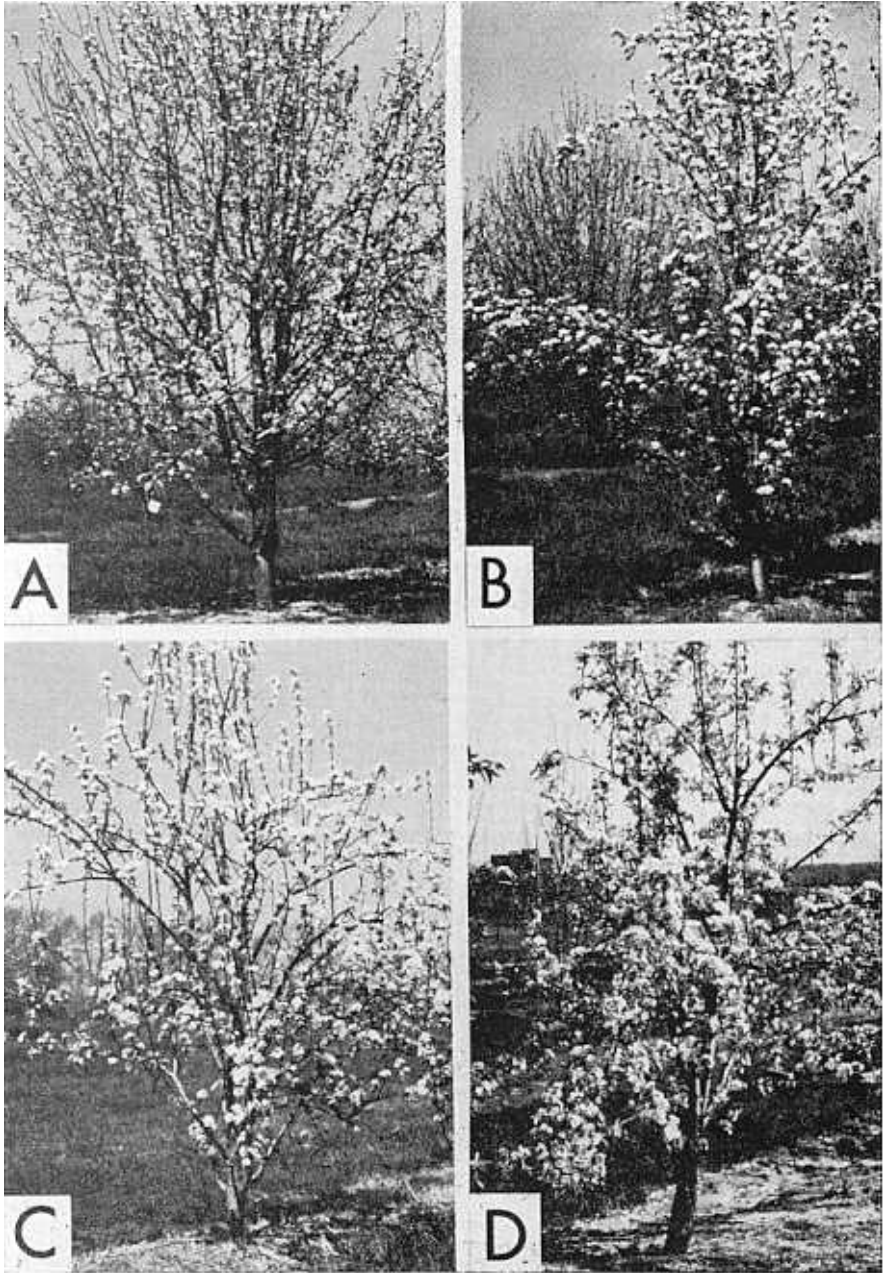


Figure 1. Comparison of full bloom in trees of 4 pear cultivars: (A) 'Magness', (B) 'Moon-glow', (C) 'Bartlett', and (D) 'Kieffer' (Spring 1972).

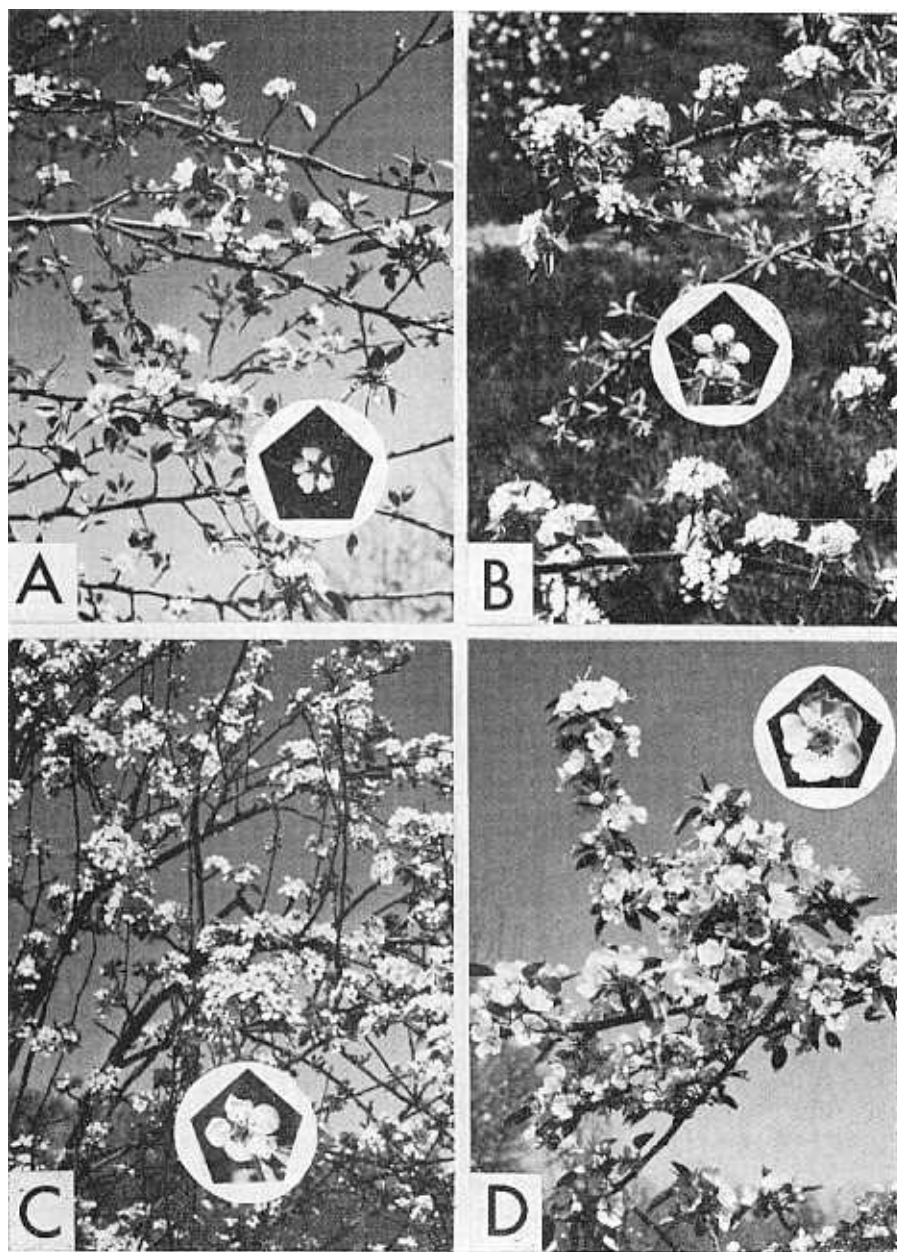


Figure 2. Close up of figure 1, showing size and density of flowers of (A) 'Magness', (B) 'Moonglow', (C) 'Bartlett', and (D) 'Kieffer'. Inserts show individual flowers photographed at the same distance.

13.5-57.7%, with an average of 24.0%. This compared favorably with results obtained with 'Moonglow', 'Bartlett', and 'Kieffer', which are known to be highly productive. The number of seeds in 'Magness' fruit was similar to that in other cultivars, indicating that fruit formation was initiated by fertilization and not by induced parthenocarpy.

Bloom and Fruit Set: During the spring of 1972, the number of flower buds and flowers per cluster were counted on approximately one-meter sections of three branches on 28 trees each of 'Magness', 'Moonglow', and 'Bartlett' in 4 replications. In mid June, the number of fruit on these branches was counted. Although the data show considerable range in number of flower buds on the three cultivars, the number on 'Magness' was within experimental error of those on 'Moonglow' and 'Bartlett' (Table 2). However, the number of flowers per flower cluster was significantly lower on 'Magness' than on either of the other two cultivars. 'Magness' had 25% fewer flowers per meter of branch than did 'Moonglow', and 12% fewer than 'Bartlett' (Figs. 1 and 2). In this experiment, no hand pollinations were made, and the fruit on each branch resulted entirely from natural pollination. Yields for 'Magness' were no lower than those for the other two cultivars.

The trees of the three cultivars used in the above test were fertilized annually with moderate amounts of nitrogen and phosphorus. Because the soils in the general area are low in boron, a condition known to produce relatively poor fruit set, this physiological condition causing poor yield can be ruled out. Girdling of trunks by removing a thin strip of bark (5-7 mm) failed to increase yields.

Table 2. Development of buds, flowers, and fruit on 9-year-old 'Magness', 'Moonglow', and 'Bartlett' pear trees (Spring 1972).

Pear cultivar	No. Buds/ meter branch	No. Flowers/ cluster	No. Fruit/ meter branch
Moonglow	57.1 a	7.9 a	7.5 a
Bartlett	68.1 a	6.5 b	7.8 a
Magness	50.8 a	5.9 c	10.0 a

Means followed by any letter in common are not significantly different at the 5% level of probability, using Duncan's Multiple Range Test.

CONCLUSION

The pollination date indicate that 'Magness' flowers can be fertilized by a wide range of pear cultivars, and that this cultivar develops flower buds and fruit as productively as some commercially grown cultivars (3). The fewer number of buds and flowers per cluster but larger number of fruit per branch indicates that 'Magness' potentially could be a heavy bearing cultivar. Compared with other commercially grown pear cultivars, however, 'Magness' has a low number of small, unattractive flowers which are less likely visited by bees. This accounts for the generally light crops in certain locations or in certain years.

Literature Cited

1. Brooks, R. M. and H. P. Olmo. 1972. Register of new fruit and nut varieties. Second edition, 707 pp. Univ. Calif. Press, Berkeley.
2. Janick, J. 1972. Observations on 'Magness', 'Moonglow', and 'Dawn', pears in Indiana. *Fruit Var. Hort. Dig.* 26:36-37.
3. Jenkins, E. W. 1941. Blossom position in pear clusters and set of fruit. *Vt. Agr. Exp. Sta. Bull.* 471, 24 pp.
4. Keil, H. L. and R. A. Wilson. 1969. Oozing associated with bud blast of pear caused by a *Pseudomonas* species. *Phytopath.* 59:1557 (Abstr.).
5. Stump, R. C. 1970. 'Magness' pear in Texas. *Fruit Var. Hort. Dig.* 24:96.