2. Frost, W. E., *J. Anim. Ecol.*, 1945, 14, 26.
3. —, *Ibid.*, 1945, 14, 106.
4. Gemzoe, K. J., *Rep. Danish Biol. Sta.*, 1908, 14, 10.
5. Jhingran, V. G., *Nature*, 1957, 179, 468.
6. Lee, R. M., *Fish. Invest. London*, Ser. II, 1920, 4 (2).
7. Pantulu, V. R., *Proc. Nat. Inst. Sci. India*, 1956, 22, 259.
8. Rao, K. V. S., *Indian J. Fish.*, 1961, 8, 121.
9. Seshappa, G., *Curr. Sci.*, 1958, 27, 262.
10. — and Bhimachar, B. S., *Ibid.*, 1951, 20, 260.
11. Van Oosten, J., *Bull. U.S. Bur. Fish.*, 1929, 44, 265.
12. Walford, L. A. and Mosher, K. H., *Spec. Sci. Rep. U.S. Fish. Wildl. Serv.*, 1943, 20, 1.
13. Waly, M., *Bull. Fac. Sci.*, Fouad 1 University, Cairo, 1940, 21, 39.

COMMON ANTIGENS IN HOST-PARASITE RELATIONSHIP*

IT has been shown in mammalian systems, that antigenic closeness between a host and a parasite, leads to a stable host-parasite relationship (host 'tolerance') while antigenic disparity leads to host resistance to the parasite (host 'intolerance')[1-3]. Although the plant does not produce an immune system similar to that in animals, the concept that common antigens between host and parasite might have a role in disease development found some support in plant pathology as well[4,5]. The present investigation is an attempt to see if this concept is applicable in vascular wilt of cotton.

Experiments were designed to look for possible common antigens between two species of cotton, *Gossypium arboreum* L. and *G. hirsutum* L. and a virulent Indian strain of *Fusarium vasinfectum* Atk. Earlier work has shown that this strain is highly pathogenic to *G. arboreum* but not to *G. hirsutum* although it infects and colonizes both to varying degrees[6]. In order to exclude errors owing to non-specific reactions in the final results, the following fungi and plants were included for reference; *Fusarium solani* (Mart.) App. *et* Wr., *F. culmorum* (W.G. Sm.) Sacc. and *Pyricularia oryzae* Cav. none of which are known parasites of cotton, and *Abelmoschus esculentus* (L.) Moench. and *Phaseolus mungo* L. plants that are not known to be infected by *F. vasinfectum*.

The extraction of the fungal antigens was as described in an earlier paper[7]. For host antigens the initial steps of extraction were the same as outlined by DeVay and co-workers[4]. The material was extracted under liquid nitrogen using polyvinyl pyrrolidone and sodium ascorbate with a pestle and mortar. Further homogenization was done in a VirTis homogeniser. The extractant used was phosphate-buffered saline at pH 7·2. The antigens were purified further by the same procedure as for fungi[7]. The antigens mixed with Freund's complete adjuvant were administered intramuscularly in a course of six injections to white rabbits (each weighing approximately 1·5 kg). Antisera were collected on 23rd day by bleeding the ear veins and stored at 0° C with merthiolate as preservative. The antisera against the two species of cotton were tested by the agar-gel double diffusion method with their antigens in homologous and heterologous reactions. The antigens of *A. esculentus* and *P. mungo* were also allowed to react with the two antisera. *G. arboreum* formed three lines of precipitation in homologous reactions and two in heterologous reaction with *G. hirsutum* while the latter showed two antigens in homologous as well as heterologous reactions. *A. esculentus*, which belongs to the same family as cotton, shared an antigen with both the species of cotton. *P. mungo* produced no precipitation with either species of cotton.

Using the same technique, the antisera and antigens of the two species of cotton were tested against the antigens and antisera, respectively, of all the test fungi. The antisera of the two species of cotton on reacting with the antigens of *F. vasinfectum*, or the antisera of the latter on reacting with the antigens of the former two, formed a single precipitin band indicating the presence of a common antigen (Fig. 1). However, such a result

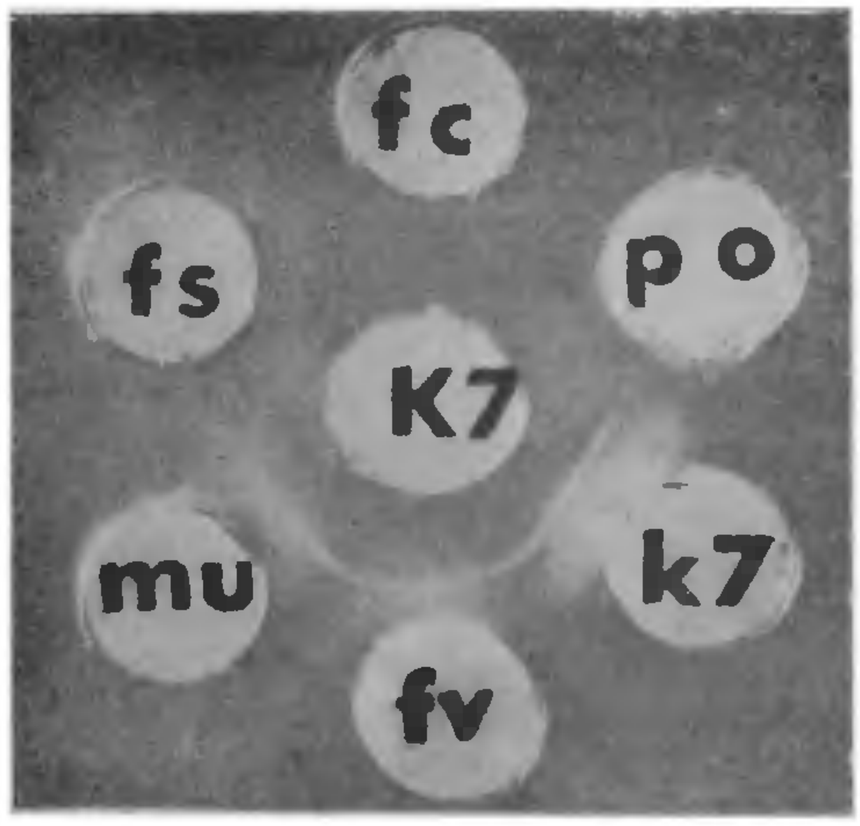

FIG. 1. Antigen of *G. arboreum* in the central well (K 7) reacting with homologous antiserum (*k 7*) and with heterologous antisera of *G. hirsutum* (*mu*), *Fusarium vasinfectum* (*fv*), *F. culmorum* (*fc*), *F. solani* (*fs*) and *Pyricularia oryzae* (*po*).

was not observed in any of the reciprocal reactions involving the other test fungi and the two cotton species, or in those between *F. vasinfectum* and the other plants.

The results of this investigation indicate the presence of a common antigen between the pathogen *F. vasinfectum* and its hosts. However, this

concept of a common antigen between a host and parasite as related to disease development ought, in our opinion, to place emphasis on *parasitism* rather than on *pathogenesis*. The intrinsic ability of the Indian strain of *F. vasinfectum* to infect and colonize (*i.e.*, to parasitize) both the species of cotton, although disease manifestation is seen *only* in *G. arboreum*, is compatible with this idea.

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1. Rowley, D. and Jenkin, C. R., *Nature*, 1962, 193, 151.
2. Dineen, J. K., *Ibid.*, 1963, 197, 268.
3. —, *Ibid.*, 1963, 197, 491.
4. DeVay, J. E., Schnathorst, W. C. and Foda, M. S., In: *The Dynamic Role of Macromolecular Constituents in Plant-Parasite Interactions*, Ed. by Mirocha, C. J. and Uritani, I., Bruce Publication, St. Paul, Minnesota, 1967, p. 313.
5. Charudattan, R. and DeVay, J. E., *Phytopathology*, 1972, 62, 230.
6. —, *Proc. Indian Acad. Sci. B*, 1969, 70, 139.
7. Kalyanasundaram, R., Desai, V. B, and Sirsi, M., *Phytopath, Z.*, 1967, 59, 39.

EFFECT OF DIFFERENT STORAGE TEMPERATURES ON KEEPING QUALITY OF AVOCADO PEAR FRUITS

It had been known for a long time that low temperature is a good means for keeping fruit after harvest. Low temperature disorders are also a determining factor for storage ability of fruits. Prolonged storage of avocado at 5° C, however, resulted in a declining rate of CO_2 production upon removal to 15° C. Chilling symptoms appeared along with the disturbance of the climacteric pattern (Biale 1941; Pratt and Biale 1944). The lowest temperature at which a rise of respiration was noted in the fuerte avocado was 7·5° C (Biale, 1946).

Mustard (1952) found that different varieties of avocados differ in its sensitivity to chilling injury. Campbell (1960) found that chilling injury occurred in mature pollack avocados stored at 35, 40, 45 and 50° F for 19 to 22 days. Biale and Young (1962) observed that in avocados at 30° F and 35° F, the fruit does not ripen but the tissue darkens.

Aharoni *et al.* (1968) stored avocado fruit at gradually decreasing temperatures, and found that the climacteric peak and softening appeared at the same time in the fruit stored at 12° (prior to the fruit stored at 8° and subsequent to that stored at 14°, 15° and 17° C). The purpose of this work is to study the effect of various storage temperatures on the quality of avocado fruits.

Materials and Methods

Freshly harvested mature fruits of Duke avocado were sorted out for size, shape, firmness to obtain uniform samples. The fruits were washed with water, then dipped for 5 minutes in solution of 5% borax as a fungicidal treatment and the samples were placed in fiberboard boxes using three carton boxes for each treatment as replicates, then cooled to the required temperatures.

Visual evaluation of the quality was made every 2 days according to the numerical quality score as described by Abdel Kader *et al.* (1968). At the same time unusable fruits were discarded and the causes of decay were recorded. At every sorting time, chilling injury symptoms were observed and noted, and also pathogenes were identified. Experiments were repeated 2 times and the average results are presented.

Results and Discussion

The relative effects of storage temperatures on quality and decay percentage of "Duke" avocado fruits is illustrated graphically in Fig. 1. Fruits held at room temperature were the first to deteriorate. Their quality loss was mainly a result of senescence as was evidenced by the loss of firmness and the development of black colour. Fruits held at 15° C followed control fruits in their deterioration.

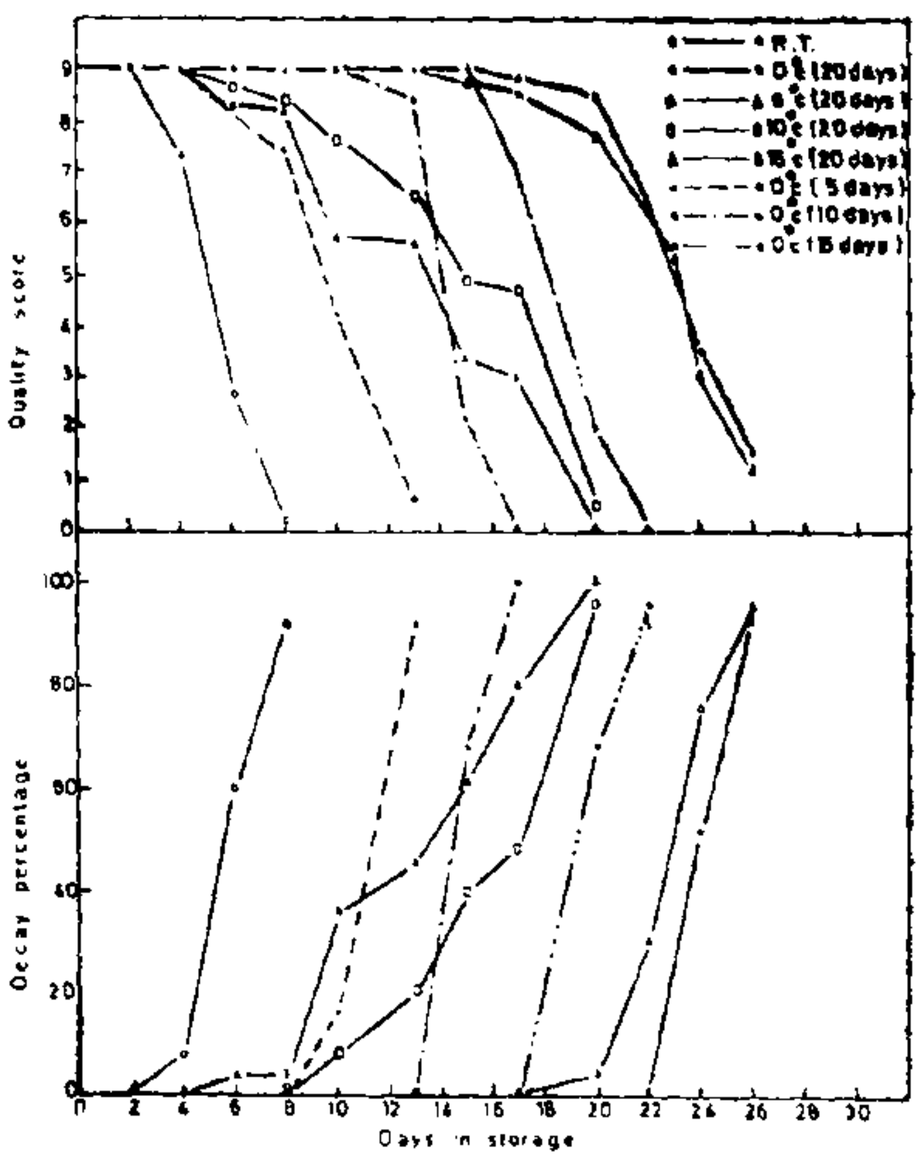

FIG. 1. Effect of temperature on quality and decay percentage of "Duke" avocado fruits during storage.

Avocado fruits that were subjected to 0° C for 5, 10, 15 and 20 days did not show any decay or