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D. A. Johnston

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TOMATO FRUIT QUALITY

The Effect of Mechanical Injury

(The second article of a series dealing with the problems of the Geraldton Industry in relation to fruit quality.)

By D. A. JOHNSTON, B.Sc. (Agric.), Agricultural Adviser

ONE of the major causes of fruit loss, and reduced quality with Geraldton tomatoes, is due to injuries suffered during handling. It is considered that the greatest immediate improvement in tomato quality, may be obtained by exercising greater care during the harvesting, grading and packing of the fruit.

Investigations carried out at Geraldton during the 1957 season, highlighted the role of mechanical injury in relation to quality. Tomato fruit samples were collected from several properties. The samples were not too large and hence could be readily examined and checked. In addition, growers were asked to supply fruit which was representative of the type of fruit being consigned to Melbourne. In this way, quality could be said to approximate as closely as possible, the quality of fruit consigned to export markets.

Upon receipt, the fruits were placed in an unheated room and stored for a period of one week. This approximates the time taken in transit to Melbourne. After examination, they were then placed in a ripening room with a temperature of 65°F. They were examined at weekly intervals, and were retained until they were either full ripe or were beginning to break down. Fruit samples were divided into two in some cases, one lot being stored on open shelves, the second lot being stored in polythene bags. All other fruit samples were stored on open shelves with free air circulation.

OBSERVATIONS

The majority of breakdowns as recorded in the ripening room was due initially to mechanical injury. It is doubtful if any fruit sample received was devoid of some form of such damage. Again, it must be remembered that the fruit samples studied, were not packed in cases, and were not jolted or roughly handled after receipt.

The types of damage evident on the fruit samples were:

1. Bruising—mainly on shoulders.
2. Skin scratching.
3. Skin lesions—small cracking.
4. Pitting—may be due to sand blast or sand in containers.

Damage to tomatoes by mechanical means, does not only show itself in direct injury to the fruit. Once the tomatoes are bruised, scratched or cut in any way, the damaged areas generally break down, and become more open to the attacks of fungi and perhaps insects. The initial amount of mechanical damage may have been slight, but once the injured fruit is attacked by parasites, substantial losses can be expected.

SECONDARY INFECTION

The main disease attacking damaged tomato fruit was the Early Blight fungus (Alternaria sp.). Other storage rot fungi were also noted on fruit stored in polythene. This type of secondary damage generally fails to develop until some time after the initial mechanical injury occurred. With tomatoes exported in a mature green condition, fungi may not develop until the fruit are placed in the ripening room, and may not appear until some two weeks after the fruits have been consigned to their destination.
The quality of fruit attacked by Early Blight deteriorates rapidly, and such fruit quickly become unsaleable. In a tightly-packed case, one infected tomato can easily spread the disease to adjacent fruit and in this way wastage becomes severe. To control the destructive effects of secondary infection, it becomes clear that an effort must be made to limit the initial cause of such infection. That is, reduce mechanical injury and use fungicides to control the disease.

Good control of Early Blight may be obtained by the regular use of Zineb sprays. During wet weather more frequent sprayings are required. Fresh spray residue on the tomato fruit, reduces the fungi spore load on the fruit and limits infection.

**HOW DAMAGE OCCURS**

Damage to fruit may occur in several ways of which the following appear the most important.

1. During picking and tipping into field boxes. The fruit are often dropped vigorously into tins or buckets. Padding on the edges and on the bottom should reduce this bruising. The edges of field boxes were frequently observed to leave quite large depressions in the fruit walls, which ultimately develop as bruises which break down. Several growers have noticed this and see to it that their tomatoes are gently emptied into boxes which are padded with bags or other material. This practice has been found to pay dividends and is recommended to limit this type of damage.

2. During tipping on the grader bins or shelves. Many bins on mechanical graders are too high. Admittedly the bins are often high to facilitate the flow of tomatoes along the grader, but this also means that the fruits are tipped too vigorously into the hoppers.

3. The speed of fruit along rollers. Fruits were seen to strike the edges of the rollers with considerable force. Padding of all edges with soft sponge rubber is advised. The roller speeds are often too great, and the fruits are bumped and scratched in the process. Much of the shoulder bruising seems to occur during the grading operations.

4. During packing. Under the present system the tomatoes have to be tightly wedged into the case. Pressure must be exerted to hold down the lid for nailing. The thin paper lining does not afford protection, and many fruits are bruised, squashed and even split during this operation. Perhaps the other types of packs, such as a scrambled pack, packing in cardboard cartons which are not completely rigid, or wrapping of fruit, could reduce the incidence of bruising.

5. During transit. Considerable bruising must occur during transport, but this type of injury cannot be controlled by the grower. A case of tomatoes returned to Geraldton by air from Melbourne, showed that severe bruising and crushing were the reasons for an almost 100 per cent. wastage. Early Blight was the only fungus noticed attacking the fruit. The loading and unloading which is carried out at least three times by indifferent handlers, does not make for a good quality sample reaching the ripening rooms.

There are several other minor factors causing injury to fruit, which deserve some mention. Pulling the fruit from the plant may cause the lifting of small sections of skin at the junction of the fruit stalk and the tomato. Sand in containers and on grading shelves was seen to leave small pits in the skin of the fruit. Studies on the fruit samples in the ripening room, showed that even such small amounts of skin damage as these, can readily become infected with the Black Spot and so reduce fruit quality.

It will be seen that some form of mechanical injury is initially responsible for the damaging secondary infections common with export fruit. To retain the quality of the tomatoes, it becomes apparent that every effort must be made to reduce the amount of mechanical damage on the farm. Any steps taken by growers, handlers and agents to reduce such damage will be repaid in better quality fruit, higher prices and greater satisfaction to all concerned.

**REFERENCES**

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