

sweetened dry cider but it is rather lower in alcohol.

Storage. The ciders, after finally being racked away from the yeast deposits, are run into suitable vessels for storage, which should be filled completely and sealed down. A cork sealed with wax will serve for jars while the storage bung described in the previous chapter is better for barrels. Cider in wooden vessels tends to evaporate or even leak due to changes in atmospheric humidity and temperature and thus needs topping up at intervals with water or clean dry cider kept in filled jars for this purpose. Stainless steel or suitably lined steel or concrete vessels prevent evaporation and once filled and sealed need no further attention. Stored cider should be kept as cold as possible.

Disorders. If the cider-making methods advised in this chapter have been followed carefully the ciders should not become spoiled by chemical or microbiological disorders. Sometimes, however, in the rush of the season an essential step may be omitted or delayed unduly and the cider deteriorates. It is as well, therefore, to be able to recognise these symptoms and to know how to cure disorders. The old saying that prevention is better than cure is most appropriate here since a reconditioned cider will never have the same quality as one that has been free from spoilage.

Chemical disorders. (a) *Metallic contamination.* If the fruit pulp, juice or cider comes in contact with iron, copper, zinc or lead some of the metal is dissolved and spoils the cider; in the case of lead, its salts are actually poisonous. By a careful choice of metals used in cider-making equipment this can be avoided although lead and possibly arsenic may get into cider made from fruit sprayed with lead arsenate against codling moth; it is best to avoid such fruit. Iron salts cause the cider to darken on contact with air and give it a harsh taste. Copper salts give the cider a very objectionable astringent flavour and may also turn it slightly green.

To prove the presence of iron add a pinch of citric acid to a wine glass full of cider. Have another wine glass full of untreated cider next to it and leave both overnight. If the treated

cider remains unchanged in colour while the untreated darkens the cause is obviously metallic contamination. If both darken then it is due to enzymic darkening, described below.

If darkening is due to iron, the main bulk of cider should be treated with $\frac{1}{4}$ lb. citric acid per 100 gallons or for smaller volumes 1 oz. per 10 gallons. This will prevent darkening but may not remove the metallic taste. If this is objectionable add 3 oz. fresh wheat bran per 10 gallons of cider, mix thoroughly, leave overnight, then strain through organdie or centrifuge or filter. Keep the cider in a filled and sealed container taking special care to keep topped up if in wooden vessels.

(b) *Enzymic darkening.* This is caused by the cider having a high content of oxidising enzymes which cause the natural tannins of the cider to combine with air, giving dark brownish colours. It only occurs if a high proportion of over-ripe or rotten fruit has been used. A glass of the still cider exposed to air begins to darken at the surface and this gradually increases until the whole of the cider is dark brown. Darkening will be delayed in carbonated cider until all the gas has been lost.

Enzymic darkening can be detected by dissolving $\frac{1}{4}$ Campden tablet in 1 pint of the cider in an open glass vessel; have an untreated pint in a similar vessel next to it. If the untreated cider darkens overnight and the treated does not then the cause is obviously enzymic darkening so that the main bulk of cider needs treating with 100 p.p.m. SO_2 (2 Campden tablets per gallon or $3\frac{1}{4}$ oz. potassium metabisulphite per 100 gallons). The treated cider must now be kept out of contact with air as much as possible.

Microbiological disorders. (a) *Acetification or Vinegaryness.* This is caused by acetic bacteria that, in the presence of air, attack the alcohol formed by the yeast and turn it into vinegar. Although economically important as the mainspring of the vinegar industry, in the cider industry these bacteria are a great nuisance and sometimes cause considerable losses. An older generation of cider drinkers considered a cider had no "bite" if it was without some acetification but nowadays the harsh aroma and flavour imparted to the cider are disliked.