

Figure 1 - Equilibrium moisture content, barley

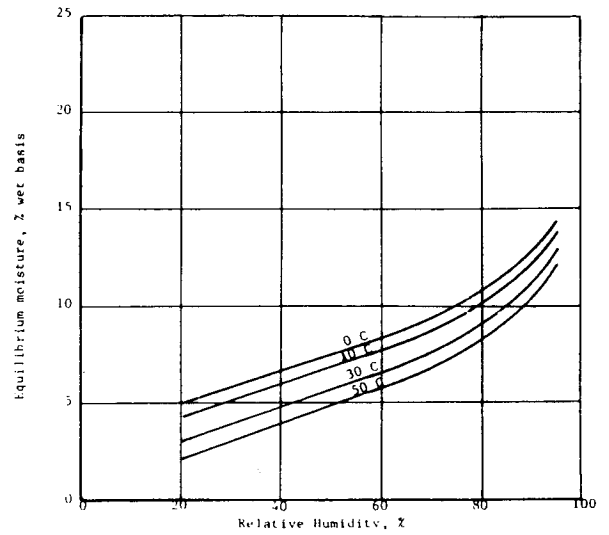


Figure 4 - Equilibrium moisture content, peanut kernel

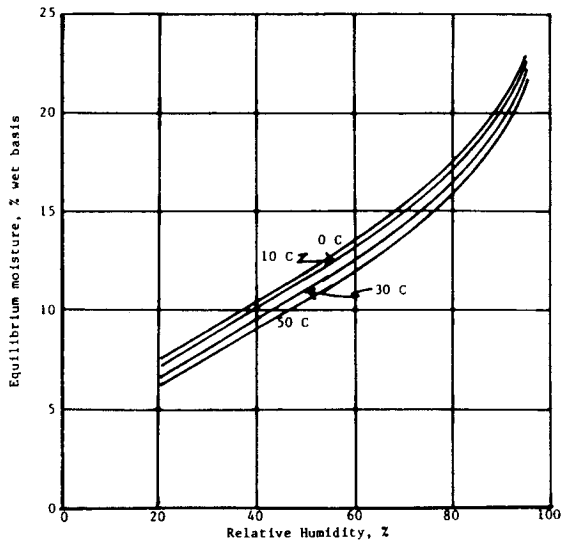


Figure 2 - Equilibrium moisture content, edible beans

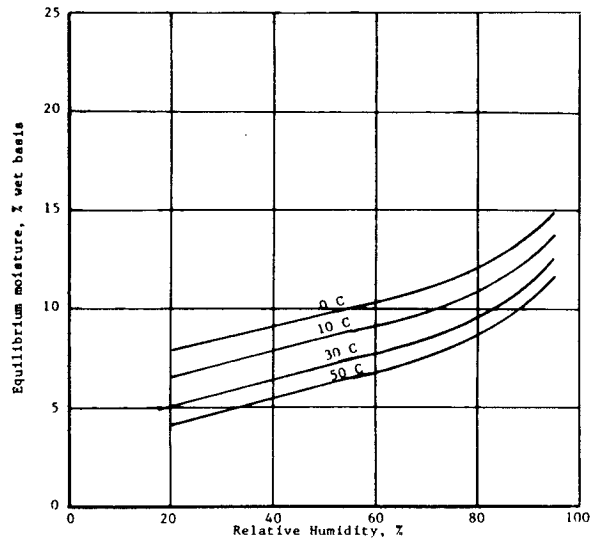


Figure 5 - Equilibrium moisture content, peanuts in pod

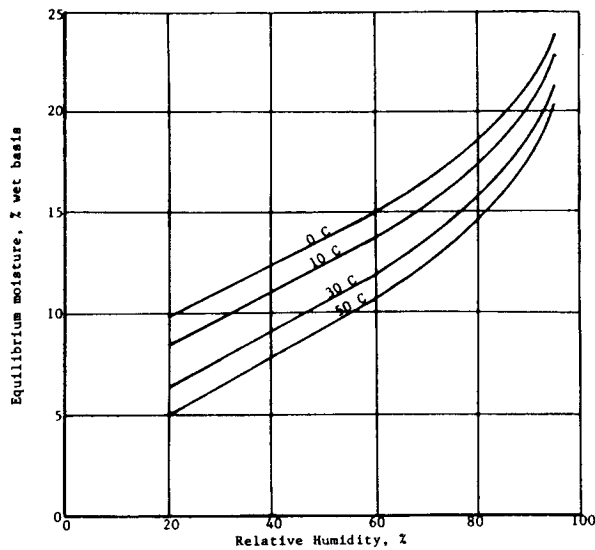


Figure 3 - Equilibrium moisture content, yellow dent corn

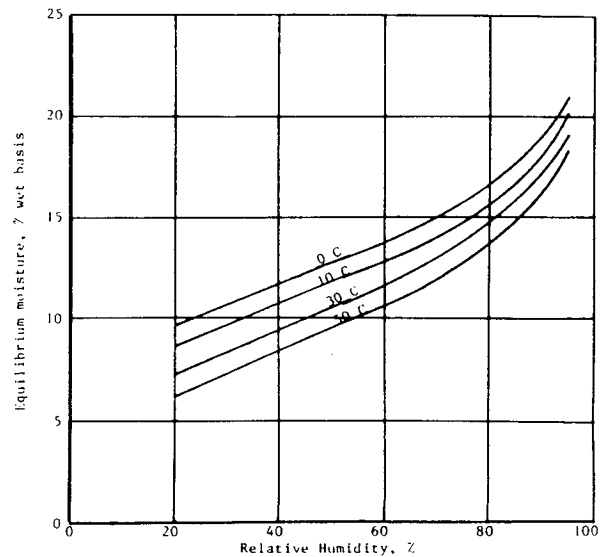


Figure 6 - Equilibrium moisture content, rough rice

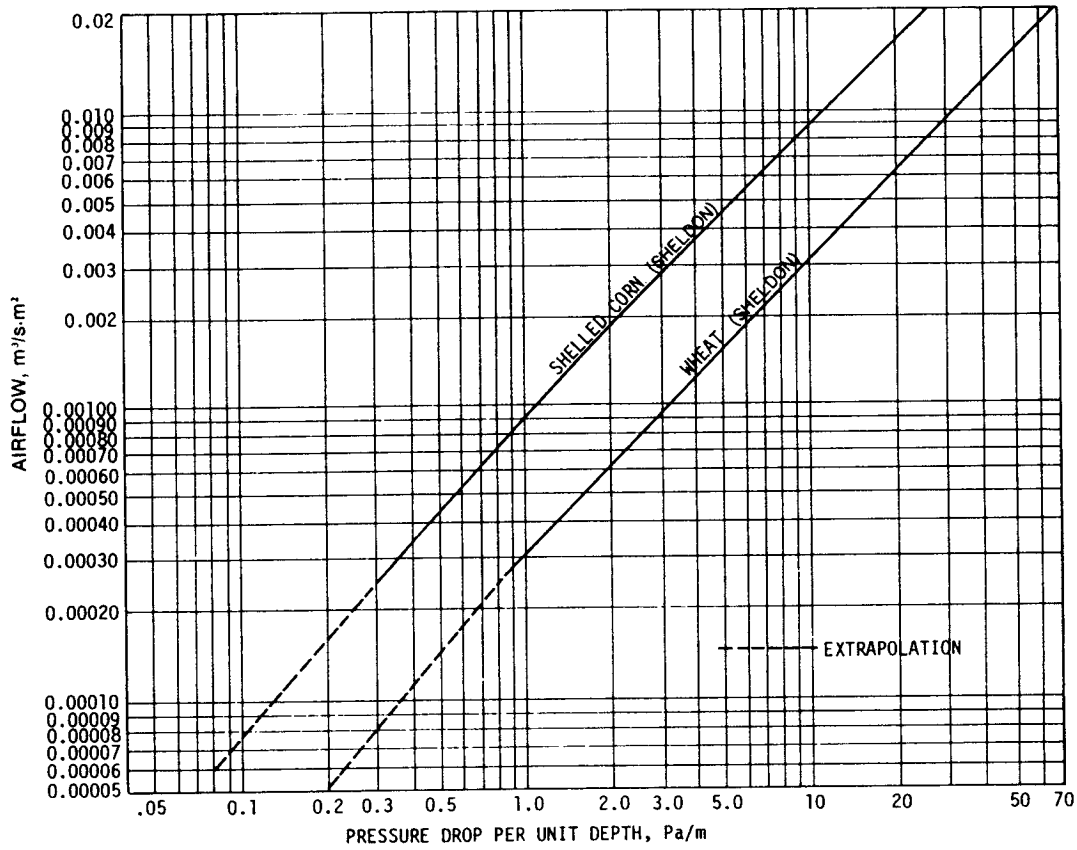


Figure 5 - Resistance to airflow of shelled corn and wheat at low airflows (SI units)

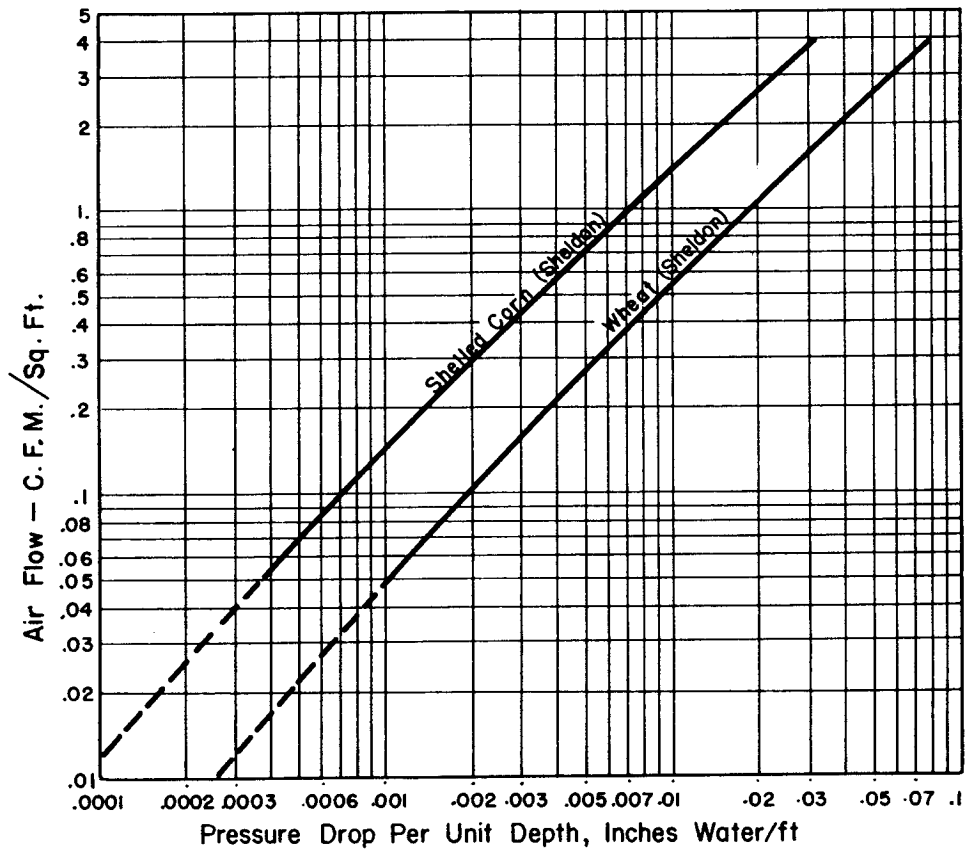
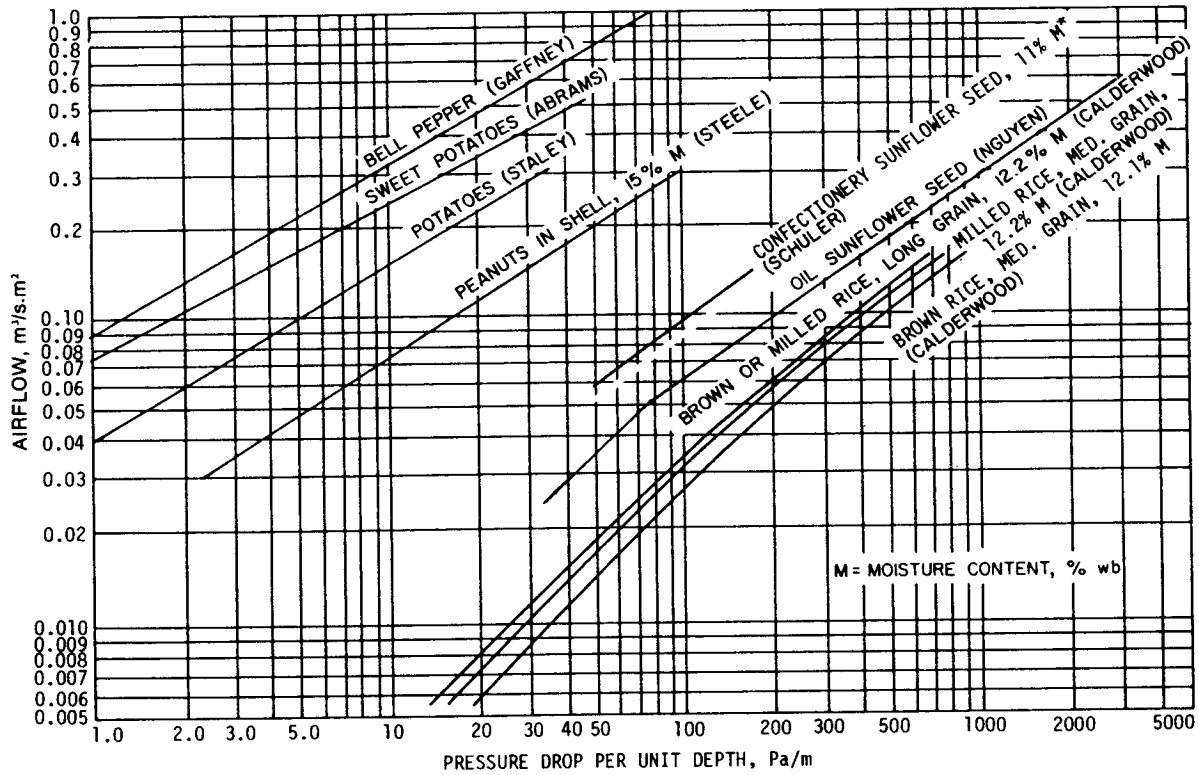
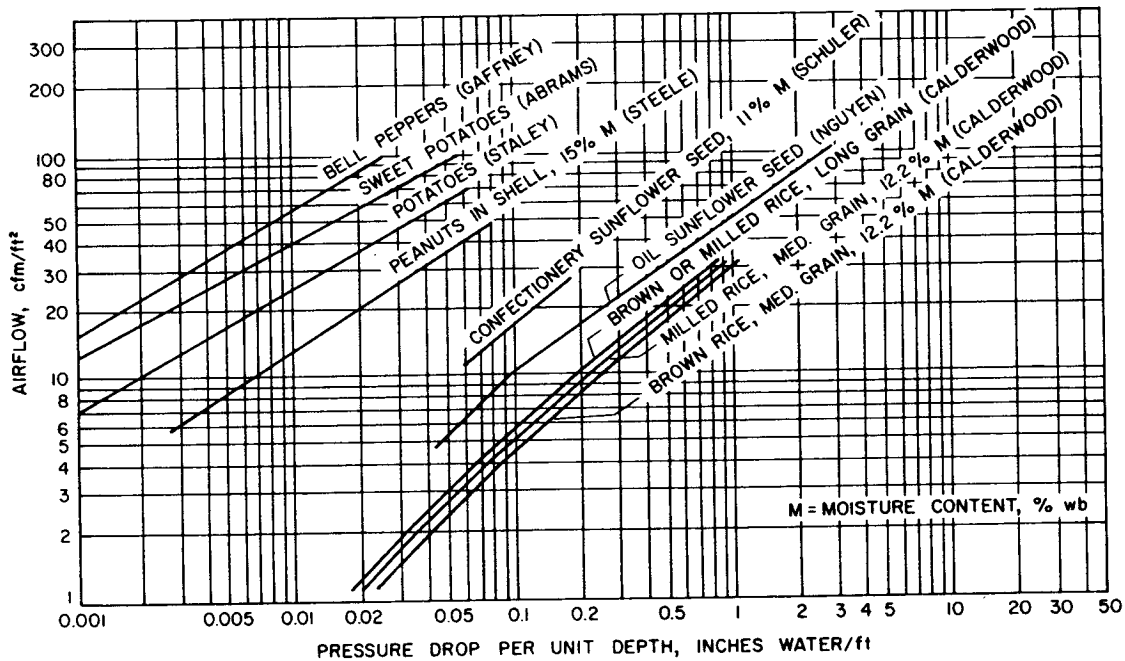


Figure 6 - Resistance to airflow of shelled corn and wheat at low airflows (Inch-pound units)



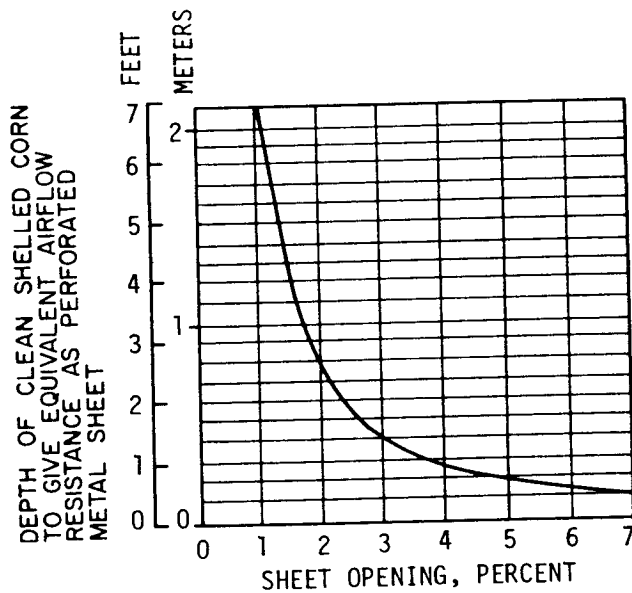
NOTES: Rice: Clean, loose-fill. A packing operation which raised the bulk density by 14-17 percent resulted in pressures 2.3 to 3.4 times those for loose fill.

Figure 3 - Resistance to airflow for other agricultural products (SI units)



NOTES: Rice: Clean, loose-fill. A packing operation which raised the bulk density by 14 to 17 percent resulted in pressures 2.3 to 3.4 times those for loose fill.

Figure 4 - Resistance to airflow of other agricultural products (Inch-pound units)



NOTES: When sheet openings amount to 20 percent, no additional resistance to airflow is produced.
A large number of small perforations is preferred to a smaller number of large perforations for the same amount of opening.
The curve shown is based on tests of sheets having width of perforations from 1 to 3.3 mm (0.04 to 0.13 in.).

Figure 7 - Resistance to airflow of perforated metal sheets when supporting grain (Henderson)

3 Airflow resistance equation

$$\frac{\Delta P}{L} = \frac{aQ^2}{\log_e(1 + bQ)}$$

where:

- ΔP = pressure drop, Pa or inches of water;
- L = bed depth, m or ft;
- a = constant for particular grain (see table 1);
- Q = airflow, $m^3/s \cdot m^2$ or cfm/ft^2 ;
- b = constant for particular grain (see table 1).

4 Effect of fines on resistance to airflow of shelled corn

4.1 An effect of adding fines to shelled corn is an increase in the airflow resistance of the corn. The pressure drop per unit bed depth can be corrected to account for fines using this equation:

$$\text{SI units: } \left(\frac{\Delta P}{L}\right)_{\text{corrected}} = \left(\frac{\Delta P}{L}\right)_{\text{clean}} (1 + (14.5566 - 26.418Q)(fm))$$

$$\text{Customary units: } \left(\frac{\Delta P}{L}\right)_{\text{corrected}} = \left(\frac{\Delta P}{L}\right)_{\text{clean}} (1 + (14.5566 - 0.1342Q)(fm))$$

where:

- ΔP = pressure drop, Pa or inches of water;
- L = bed depth, m or ft;
- Q = airflow, $m^3/s \cdot m^2$ or cfm/ft^2 ;
- fm = decimal fraction of fines, by weight.

NOTE - Range of applicability: 0.076 to $0.20 m^3/s \cdot m^2$ (15 to 40 CFM/FT^2) and $0 \leq fm \leq 0.2$. Broken grain and other matter which passed through a 4.76-mm (12/64-in.) round-hole sieve are defined as fines. (Hague)

5 Effect of bulk density on resistance to airflow of shelled corn

5.1 An increase in bulk density causes an increase in the airflow resistance per unit bed depth of the corn. The pressure drop per unit bed depth can be predicted as a function of airflow rate and corn bulk density by use of this empirical equation:

$$\frac{\Delta P}{L} = X_1 + X_2 \frac{\left(\frac{\rho_b}{\rho_k}\right)^2 Q}{\left(1 - \frac{\rho_b}{\rho_k}\right)^3} + X_3 \frac{\left(\frac{\rho_b}{\rho_k}\right) Q^2}{\left(1 - \frac{\rho_b}{\rho_k}\right)^3}$$

where:

- ΔP = pressure drop, Pa or inches of water;
- L = bed depth, m or ft;
- ρ_b = corn bulk density, kg/m^3 or lb/ft^3 ;
- ρ_k = corn kernel density, kg/m^3 or lb/ft^3 ;
- Q = airflow, $m^3/s \cdot m^2$ or cfm/ft^2 ;
- X_1, X_2, X_3 = constants (see table 2 or table 3).