value given is the average of five simultaneous determinations.

Series A		Series B		Series C	
Temp.	Amount absorbed	Temp.	Amount absorbed	Temp.	Amount absorbed
0.0°C.	5.77 mg	0.0°C.	57.2 mg	0.0°C.	27.9 mg
8.5	8.5	8.2	96.6	9.5	38.3
23.5	12.2	24.0	132.2	23.8	49.0
35.0	15.1	34.8	171.8	35.0	59.8
				43.0	66.5

The soil used in Series A and B was a loam having a moisture equivalent of 23 per cent. The moisture content was 12 per cent. in series A and 18 per cent. in series B. Series C was obtained with a clay soil having a moisture equivalent of 30 per cent. and a moisture content of 22 per cent.

Inspection of these data shows clearly that increasing the soil temperature materially increased the rate of movement of water from soil to porcelain absorbing surface, or in other words increased the water-supplying capacity of the soil. While it can not safely be assumed that exactly the same relations hold between soil and soil-point cones as between soil and roots, yet it seems very likely that increasing soil temperature produces an equally marked effect on the movement of water from soil to root. If this is true, then lowering the temperature of the soil directly decreases the absorption of water in two ways: First, by its physical effects (chiefly increased viscosity and decreased vapor pressure), which result in a slower movement of water from soil to root; and second, by its physiological effects on the permeability of the root cells. Soil temperature also affects root growth and hence the size of the absorbing system, and thus indirectly the amount of absorption.

It is evident that studies of the effect of temperature on absorption in which the roots are surrounded by liquid water do not take into account the effects of temperature on the water-supplying capacity of the soil, the factor which may be of most importance in the field. Such studies may yield valuable information concerning the effects of temperature on the permeability of the root cells, but only by the use of plants rooted in soil can information be obtained which will apply to plants growing under natural conditions. It is also evident that diurnal and seasonal variations in soil temperature will affect field determinations of water-supplying capacity. Field studies should therefore be planned in such a manner as to minimize the effects of these variations.

PAUL J. KRAMER

DUKE UNIVERSITY

GOSSYPOL, A CAUSE OF DISCOLORATION IN EGG YOLKS[1]

IN preliminary experiments it was observed that egg yolks from hens fed cottonseed meal, when placed in an atmosphere of ammonia, changed in a short time to an olive, brown or chocolate color, depending on the level of this ingredient in the ration. Therefore eggs from hens fed various fractions of raw cottonseed or cottonseed meal were examined before and after this treatment and after storage at 30° C. from 30 to 60 days.

Cottonseed meal, cottonseed meal autoclaved at 20 lbs. pressure for 4 or 24 hours, acid-extracted cottonseed meal, ether-extracted cottonseed meal, raw cold-pressed cottonseed oil, crude and purified gossypol produced yolks that were naturally discolored or developed discoloration during storage at 30° C. or in the atmosphere of ammonia. One to two per cent. $FeSO_4 \cdot 7H_2O$ protected against discoloration in rations containing as high as 40 per cent. cottonseed meal.

Quercetin, cottonseed hulls, refined cottonseed oil, acid extract of cottonseed meal and ether-extracted raw cottonseed did not produce discolored egg yolks. Since free or bound gossypol is present in those fractions producing discoloration and absent in those not producing this condition, these studies indicate that free or bound gossypol is a cause of discoloration in yolks of eggs from hens fed cottonseed products.

Gossypol in rations that did not contain cottonseed meal was found to produce yolk-spotting and small egg size similar to that obtained in eggs from hens fed cottonseed products. It was laxative to hens, as is cottonseed meal. The addition of ferrous sulfate has been found to prevent this catharsis.

The natural amount of iron in rations composed of feeds of high iron content is beneficial to a certain degree but has been found to be insufficient to take care of 25 per cent. of cottonseed meal in the ration. This beneficial effect of soluble iron is proportional to the gossypol content of the cottonseed meal used. It is believed from a commercial point of view that the ammonia treatment cited above would be of value in testing sample eggs from lots believed to have been obtained from hens fed cottonseed meal. If found to respond to this test, these lots of eggs could be used for immediate consumption instead of being placed in storage.

P. J. SCHAIBLE
L. A. MOORE
J. M. MOORE

MICHIGAN AGRICULTURAL EXPERIMENT STATION
EAST LANSING, MICHIGAN

[1] Published with the permission of the Director of the Experiment Station as Journal Article 166 (n. s.).