

present in medullary rays and secondary cortex of my specimen (Fig. 1).

In conclusion, I wish to express my gratitude to Dr. S. R. Bose, Professor of Botany of this College, for his valuable help and favourable criticism.

D. N. CHAKRAVERTI.

Botany Department,
Carmichael Medical College,

Calcutta,

March 20, 1940.

¹ Solereder, H., *Systematic Anatomy of the Dicotyledons* (Eng. Trans.), Oxford, 1908.

² Koch, L., *Entwickl. d. Grasse*, *Verh. naturhist. med. Ges. Zool. Hochberg*, 1874, 1 Heft.

³ Ternets, Ch., *Bot. Zeit.*, 1902, 60:1 20 and Tab. 1.

⁴ Dattar, R. H., and Kapadia, G. A., *J. Ind. Bot. Soc.*, 1931, 10, 119.

⁵ Joshi, P. C., *Proc. Ind. Acad. Sci.*, 1936, 4, 52.

⁶ De Bary, A., *Comparative Anatomy of the Phanerogams and Ferns* (Eng. Trans.), Oxford, 1884.

⁷ Haberlandt, G., *Physiological Plant Anatomy* (Eng. Trans.), London 1911.

⁸ Joshi, A. C., *Proc. Ind. Acad. Sci.*, 1935, 2, 424.

Vernalisation of Indian Crops

Extensive investigations were carried out for the last two years to vernalise (accelerate the flowering date) through the Russian method of pre-sowing cold treatment of the seeds of some of the economic crops, viz., wheat, barley, oat, gram, pea and cicer. The seeds were soaked in water for four to five hours and after rinsing out the superfluous water, the swollen seeds were placed inside a refrigerator set at a temperature ranging from 6° C. to 8° C. and kept for different periods, 7, 14 and 21 days. In the latter period the coleoptiles protruded from 3 mm. to 5 mm. in length. In none of the experimental crops under the different periods of treatment any significant shortening of the flowering time could be observed. The experiments were repeated in more than one season. The non-response of the tropical crops to this method of pre-treatment as compared to the favourable response of the temperate crops to the latter may be attributed to (1) the quali-

tative difference between the phasic development of the temperate crops with their lower temperature (thermal stage) and long day conditions (photostage), and the tropical crops with their warmer thermostage and photostage of short day conditions; (2) the effect if any, of the pre-sowing thermal treatment and its possible dependence on the subsequent periods of photostage according to the long or short day conditions, in which the plant has to grow; (3) the probability that the combination of pre-sowing cold treatment and long day conditions as is the case in the temperate climates is only effective, while short day conditions may tend to retard it. This fact seems more evident when actually the cold treatment fails to bring any significant response in the tropical crops.

Therefore the problem of vernalisation of Indian crops presents itself for further investigations under the following aspects: (1) Effect of pre-sowing treatment alone; (2) supplementing the pre-sowing treatment with further post-sowing photostages; (3) is it possible to give the post-sowing photostages as a pre-sowing treatment? Accordingly a scheme as shown in Table I was worked out in case of wheat Pusa var. 165.

From the above set of experiments some very interesting results were obtained. In Experiments 1 and 2 no earliness in the ear emergence was observed either in cold or in warm pre-sowing treatments; but a marked earliness sets in as a result of supplemented post-photoperiodic treatments, being 6.0 days for 24 hours and 12 hours periods and no earliness for 6 hours period. In all the post-sowing photoperiodic treatments in Experiments 1 and 2 the control set behaves similarly as the treated ones, i.e., the same degree of earliness is seen as a result of the post-sowing photoperiodic treatment irrespective of whether the seeds were vernalised or not vernalised at all. In Experiments 3, 4 and 5 thermal factor as supplemented by photo factor as a pre-sowing treatment brings in an earliness of 3.0 days from that of the control; but by a further dose of post-sowing photoperiodic treatment a marked earliness of 15.0 days sets in, in 24 hours

TABLE I

No. of Expts.	Pre-sowing treatments			Post-sowing treatments*				
	Thermal factor	Photo-factor	Duration of treatment	Control	Photo-periods			Duration of treatment
					1 set	2 set	3 set	
			days		hrs.	hrs.	hrs.	days
1	Cold 6°-8° C. ..	Darkness	9	Normal day and night temperature and photo-periods	6	12	24	10
2	Warm 20°-22° C. ..	do.	9	do.	do.	do.	do.	do.
3	Cold 6°-8° C. (9 days) ..	24 hrs. from a 200 watt lamp at a distance of 1 ft. (9 days)	9 + 9	do.	do.	do.	do.	do.
4	Warm 20°-22° C. ..	do.	9 + 9	do.	6	12	24	10
5	..	do.	9	do.	do.	do.	do.	do.
6	Control.—Seeds soaked for 4 to 5 hours and sown → simultaneously with the treated ones			Given the same photo-periods				

* Seeds were treated to different photo-periods for the duration of the first ten days from the date of sprouting and then allowed to grow under normal day and night conditions.

light period and 7.0 days in 12 hours light period. This is very significant and indicates the tendency of the earliness to appear when the applied dose of photo factor is greater.

The important results may be summarised in Table II.

The results tabulated under 1, 2, 3 and 4, show the influence of the photo factor in pre- and post-sowing stages in inducing earliness of flowering. From (1) and (3) we find that a pre-sowing photo-treatment hastens the earliness of flowering by three days only, while from (2) and (4) we find that a similar pre-sowing treatment on plants which are further subjected to post-sowing photo-treatment increases the earliness of flowering from 6 to 15 days.

From the above it seems that in tropical wheat the second phase of photostage brings in a complication which tends to retard the process of vernalisation by pre-sowing cold treatment which is found to be successful with the temperate wheat. Investigations to further

TABLE II

No.	Treatments	Mean ear emergence from the date of sowing		Earliness in days
		Treated	Control	
		days	days	
1	Vernalised in cold or warm and allowed to grow under normal day and night conditions ..	54	54	Nil
2	Vernalised in warm or cold and allowed to grow under the photo-periods of			
	6 hours ..	54	54	Nil
	12 ,, ..	48	54	6.0
	24 ,, ..	48	54	6.0
3	Vernalised in light and allowed to grow under normal day and night conditions ..	52	55	3.0
4	Vernalised in light and allowed to grow under the photo-periods of			
	12 hours ..	48	55	7.0
	24 ,, ..	40	55	15.0

elucidate the above facts and to find out the nature of the phasic development of the tropical plants are in progress in this Institute and some of the valuable results so far obtained are in course of publication.

B. K. KAR.

Bose Research Institute,
Calcutta,
March 12, 1940.

Volant Animals which act as Carriers of San Jose' Scale

The San Jose' Scale [*Quadraspidiotus (Aspidiotus) perniciosus* Comst.] is a destructive pest of deciduous fruit trees. It is commonly distributed through nursery stock. Once it is established in a locality it gets distributed, among other means, by those flying animals which visit an infested fruit tree either to feed, or for shelter and rest as well. World literature dealing with the spread of this pest was consulted and it was found that the information concerning the species of volant animals which act as carriers of its nymphs was extremely meagre. Therefore, it was decided to find out the species of these volants in N.W. India and the work was carried out in the autumn of 1939 in the Kulu Valley.

For the purpose of this study birds and bats were shot from the infested and uninfested orchards as well as from the infested and uninfested plants in the jungle and solitary plants in the fields. During the period that this work was in progress 266 birds and bats were killed and this number comprised 26 species of birds and one species of bats. As soon as the shot animal dropped to the ground it was picked up, placed on a white paper and its legs examined for nymphs very carefully with a hand lens. It was then fumigated and shaken, and the nymphs that dropped off its body were collected for their identification in the laboratory.

The nymphs of San Jose' Scale were found on the following six (1-6) species of Passerine birds and on a (7) bat:

1. The Yellow-billed Magpie: "Chhanchhla" or "Tyng-jogring" (*Urocissa flavirostris flavirostris* Blyth.: Corvidæ).

2. The Indian Jungle Crow: "Dhal Kawa" or "Jangli kawa" (*Corvus macrorhynchus levaillanti* Less.: Corvidæ).
3. The Common Indian House Crow: "Kawa" (*Corvus splendens splendens* Vieill.: Corvidæ).
4. The Common Myna: "Desi-maina" (*Acridotheres tristis tristis* Linn.: Sturnidæ).
5. The Simla Streaked Laughing-Thrush: (*Trochalopteron lineatum griseicentior* Hartert: Timaliidæ).
6. The White-cheeked Bulbul: "Painju" (*Molpastes leucogenys* Gray: Pycnonotidæ).
7. The Flying Fox: "Barbagal" or "Badur" (*Pteropus giganteus giganteus* Brun.: Pteropodidæ).

Out of these, the first four species (1-4) of birds and the bat (7) are very commonly met with in the valley while the last two species of birds (5-6) are comparatively rare.

We are grateful to the Punjab Government for their very kindly granting exemption from all provisions of Section 7 of the Punjab Wild Birds and Wild Animals Protection Act (in the Kulu Valley) and to the Curator, Bombay Natural History Society, for his confirming our identification of Nos. 1-4 and for identifying Nos. 5-7.

KHAN A. RAHMAN.
ASA NAND KALRA.

Entomological Laboratory,
Punjab Agricultural College,
Lyallpur,
April 30, 1940.

Detection of Adulteration in "Ghee" (Clarified Butter) by the Fluorescence Technique

IN the March issue of *Current Science*, a note¹ was published suggesting a new method for the detection of adulteration in ghee. The authors of this note do not seem to be aware of the work of J. B. Jha,² which they have confirmed and which appeared some seven months back in one of the well-known scientific journals of this country.