

encouraging. Further work on different aspects is actively proceeding.

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1. Bose, S. R., *La Cellule*, 1934, Tome 42 and *J. Ind. Bot. Soc.*, 1938, 17.

TIP-BURN OF PIPER BETLE IN THE CENTRAL PROVINCES

TIP-BURN, a physiological disease of *Piper betle*, has been observed to cause considerable damage to the crop in this Province during the hot and dry months. The disease is characterised at first by wilting of the tissues at the extreme tips or sometimes at the margins, followed later by a browning and death of the tissue (Fig. 1). These dead and brown-coloured patches later turn hard and brittle and

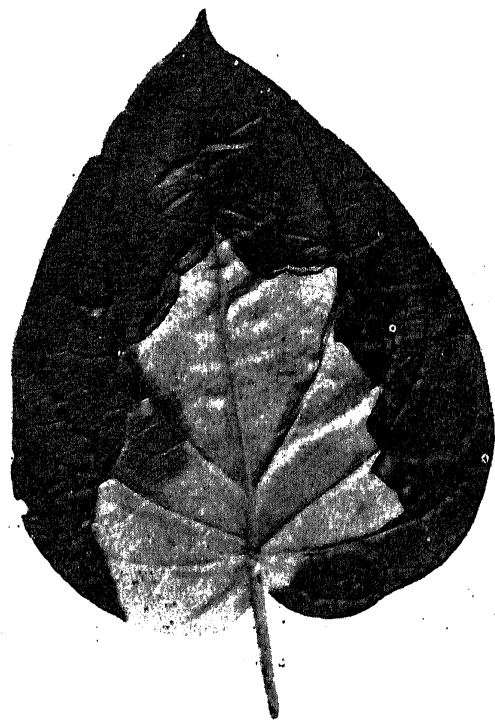


FIG. 1. Tip-burn of *Piper betle*

are often broken or torn. A part or the whole of a leaf may succumb to this disease. Unlike fungal or bacterial infections the diseased leaves do not drop off but remain attached to the vines in a flaccid condition. Young and immature leaves are more severely affected than the old and mature ones. *Kapuri* variety of pan, whose leaves are of softer and thinner texture, has been observed to be highly susceptible to this disease than *gangeri*, *kakher* and *bangla* varieties with thicker leaves. *Bangla* variety of pan has been observed to be most resistant of all the varieties under observation. It has been further noticed that

leaves on the vines affected with foot-rot disease (*Phytophthora parasitica* var. *piperina* Dast.) with poor root system succumb more readily to tip-burn than those on healthy plants.

The disease is caused by excessive loss of moisture from the leaves due to hot and dry weather conditions which prevail during the months of March to June in this Province. It is first observed towards the end of March or beginning of April and reaches to its maximum severity about the middle of May. The incidence of the disease is not marked after the rains set in. Repeated isolations from the diseased portions have given negative results about the presence of any pathogenic micro-organism.

It has been worked out and experimentally shown that this tip-burn disease could easily be kept in check or its incidence considerably reduced if the *barejas* (pan-gardens) are properly shaded at the top, the vines are lowered latest by the second week of March and the garden is kept moist by adequate irrigation during the hot and dry months.

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VERNALISATION OF MUSTARD

In their note on "Studies on the Physiology of Mustard", published in the June 1944 number of *Current Science*, J. C. Sen Gupta and N. K. Sen have reported their interesting observations on photoperiodic and vernalisation studies with Tori No. 7 and Rai No. 5. The authors observed that Rai No. 5 sown on September 1, 1943, took 46 days to flower, whereas from a sowing of November 15, 1943, flowers were observed in 27 days. On the basis of this observation the authors have concluded that "the vegetative period shortens with lower temperature". But further on in their note, they state that "Rai shows a lengthening of vegetative period with the shortening of the light period and a greater shortening of the vegetative period is observed with increased temperature range and this confirms Sen and Chakravarti's findings (1942)." It is difficult to reconcile these two statements which appear to be directly contradictory. As a matter of fact, it has been our experience that, under otherwise similar cultural conditions, lower temperature invariably lengthens the vegetative period.

The authors observed the effect of prechilling of "soaked unsprouted seeds" of Tori and Rai at 2-4° C. for 10, 20 and 30 days. They state, "Sen and Chakravarti (1942) have reported a clear earliness of flowering in mustard due to presowing low temperature treatments. The results reported here do not confirm their findings . . ." In reply, we wish to point out that we have never asserted that all strains of mustard will respond to vernalisation, but we³ have stated that all the five strains of mustard with which we worked—T 27, C 11, C 9, *raya* O/B I and yellow *sarson*—do give a very definite vernalisation response. In the Discussion on Vernalisation² held by the I. C. A. R. in December 1939, points strongly

emphasized by one of us were that (i) experimental data must be obtained to find out whether particular strains of a selected crop will or will not respond to vernalisation, (ii) to obtain this information, experiments with different strains of crops should be undertaken in various regions and (iii) the study of the effect of prevailing aftersowing environmental factors of given regions on the life-cycle of both vernalised and untreated seeds is essential to evaluate the practical possibilities of vernalisation for agriculture.

It may well be that Rai No. 5 and Tori No. 7 do not respond to vernalisation but from the experimental work reported by Sen Gupta and Sen no definite conclusion seems to be justified for the following reasons:—

1. The maximum period of chilling used by the authors was only 30 days, a period which at least in the case of five strains of mustard referred to above we have found to induce only incomplete vernalisation. Wide variation in vegetative cycles as reported by the authors for Rai No. 5 and Tori No. 7 is usually one of the characteristics of an incompletely vernalised batch of seeds.

2. The fact that unspouted soaked seeds were chilled at 2-4° C. for different periods does not in itself ensure that they were properly vernalised. The authors have not given any idea of the conditions of the different batches of seeds after chilling, nor have they described the technique used. To induce effective vernalisation the life-activity of the embryo during the process of chilling must continue. It has been our experience^{1,3} that under effective chilling conditions a certain percentage of seeds in every batch under treatment will invariably sprout, and this is a visual indication that the life-activity of the embryos has not been suspended during the period.

3. There is no evidence that the authors have taken into consideration the full implications of their own final remark, a truism to all students of vernalisation work, "that for any conclusion arrived at, after vernalisation studies, the variety and the post-treatment environmental conditions should always be taken into account". For they have formed their conclusions from the data obtained from a single sowing of Rai No. 5 and Tori No. 7 on October 1, 1943.

Vivekananda Laboratory,
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July 7, 1944.

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1. Sen, B., and Chakravarti, S. C., *Indian J. Agric. Sci.*, 1938. 2. —, *Third Meeting Crops and Soils Wing, I.C.A.R.*, 1940. 3. —, and Chakravarti, S. C., *Indian J. Agric. Sci.*, 1942.

SELF- AND CROSS- INCOMPATIBILITY IN SOME DIPLOID SPECIES OF SOLANUM

PAL and Pushkarnath¹ and later Pushkarnath² have presented evidence showing that self- and cross-incompatibility in *S. Caldasii* and *S. subtilius* is genetical and is controlled

by a series of five oppositional factors. Further studies with these two species and with *S. chacoense* and E.P.C. 143 (an unidentified South American variety obtained from the Empire Potato Expedition, probably belonging to *S. subtilius*), have shown the presence of six additional factors which belong to the same allelomorphous series. The experimental evidence, briefly summarised below, shows that these six factors are distinct from the five reported earlier, thus bringing the total to eleven.

1. Family No. D-29—*S. Caldasii* var. 1 × *S. Caldasii* var. 07.—Crossing tests made with 14 F₁ plants gave four intra-sterile groups of plants, A₁, B₁, C₁, D₁, with 4, 3, 2 and 5 plants respectively, in each group.

2. Family No. D-34—*S. Caldasii* var. 07 × *S. Caldasii* var. 1.—This was the reciprocal of the previous cross and tests made with 15 F₁ plants indicated here also the presence of four intra-sterile groups of plants, W, X, Y and Z, in the proportion of 6, 4, 2 and 3 plants in each group respectively.

Further experiments proved, as was expected, that the A₁ class of family D-29 was identical, with the Y class of family D-34 and B₁ with W, C₁ with X and D₁ with Z. For this reason plants belonging to the classes W, X, Y and Z were eliminated from further tests.

3. Family No. C. 115—*S. Caldasii* var. 01 × E.P.C. 143.—Seventeen F₁ plants tested gave four groups of intra-sterile plants in the proportion of 4, 4, 6 and 3 plants. These groups of plants were designated as E₁, F₁, G₁ and H₁ respectively.

4. Family No. C. 198—*S. chacoense* var. 07 × *S. subtilius* var. V₁.—Out of 20 F₁ plants raised in this family 12 were tested and four intra-sterile groups of plants, I₁, J₁, K₁ and L₁ established with 2, 5, 4 and 1 plants in each of the groups respectively.

The four families referred to above, thus gave a total of 12 intra-sterile groups of plants (A₁ to L₁). Crosses made reciprocally, in all possible combinations, amongst these 12 groups of plants showed that these were cross-compatible, thereby indicating that the constitution of no two groups of plants was identical and that the six varieties used as parents in the above-mentioned series of crosses differed in respect of the pair of sterility factors present.

The genetical constitution of *S. subtilius* var. V₁ (S¹S³), *S. Caldasii* var. 01 (S¹S⁵) and *S. Caldasii* var. 07 (S²S⁴), which have been used in the above crosses, was already established by our previous studies and it was known that these varieties between them carried five sterility factors. The present series of crosses was designed to discover whether any of these factors was present in the other three varieties used in the crosses.

The plants of the 12 intra-sterile groups (A₁ to L₁) when crossed with the ten 'testers' carrying S¹S², S¹S³, S¹S⁴, S¹S⁵, S²S³, S²S⁴, S²S⁵, S³S⁴, S³S⁵ and S⁴S⁵ combinations of factors gave (with the exception of two doubtful cases) completely cross-compatible reactions. Therefore none of the 12 groups of plants had any of the above combinations of