

only. The alkaloidal crystals obtained by Katti and Shintre, and also obtained by us by following their method, were not free berberine but salts of berberine and, therefore, naturally did not give the melting point of pure berberine. Presumably they were salts of two different acids, as they obtained crystals with two different melting points. It was not thought to be of sufficient importance to isolate and identify these acids.

EXPERIMENTAL

The drug was purchased from a local dealer and identified in the botanical department of the University College.

The powdered air-dried stem (180 gms.) was defatted with petrol and soxhleted with alcohol. From the alcoholic extract (9.2 gms.) warm water dissolved 6.2 gms. From the insoluble residue, the remaining alkaloids were dissolved out with warm 4 per cent. acetic acid and precipitated as nitrate with strong potassium nitrate solution (A).

The aqueous extract, on concentration and cooling, gave a crystalline alkaloidal material (.8 gm.; B), which was also converted to the nitrate. The aqueous filtrate, also gave a nitrate (2.6 gms.; C).

BERBERINE-ACETONE COMPOUND

0.1 gm. of the nitrate was dissolved in water (10 c.c.) and mixed with 2 c.c. of 10 per cent. aqueous sodium hydroxide, heated to 50° C. mixed with 5 c.c. of acetone and set aside. A lemon yellow powder separated. Melting point 167-169° C. (decomp.).

BERBERINE REGENERATED FROM ACETONE COMPOUND

The free base was liberated from the acetone compound by boiling 0.2 gm. of it with alcohol on a water-bath. The alcohol was driven off and the residue recrystallised from water. It melted at 145° C. both alone and after admixture with a sample of pure berberine.

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June 11, 1943.

1. Perrins, *Ann.*, **83**, 276 2. Chopra, *Indian Medicinal Plants*, p. 295. 3. Katti and Shintre, *Arch. Pharm.*, **1930**, **268**, 314-21.

CATALYSIS OF VANADATE-HYDRIODIC ACID REACTION BY THE OXALATE ION

In a previous publication¹ we reported the catalysis of the reaction between dichromate and hydriodic acid by the oxalate ion. We have carried out a survey of numerous reactions involving the oxidation of hydriodic acid by such substances as hydrogen peroxide, potassium persulphate, sodium arsenate, potassium chlorate, potassium bromate, and potassium iodate to ascertain the possible catalytic effect of oxalate ion. No catalytic effect was observed in these cases. It was, however, found that the oxalate ion has a profound accelerating action on the reaction between vanadic acid and hydriodic acid.

The reaction was followed by titration of the iodine liberated with sodium thiosulphate. The

concentration of sodium vanadate was varied from 0.025 N to 0.00025 N and that of sodium oxalate from 0.225 N to 0.0005 N. The reaction was studied in the presence of air, in vacuum, and in an atmosphere of carbon dioxide.

In seeking an explanation for the mechanism of the catalytic action of oxalate ion on these reactions, we have to take into account the numerous resemblances between chromates and vanadates. Both chromic acid and vanadic acid form poly-acids, and, possibly, complexes with oxalic acid. It seems, therefore, that in the reaction between chromate and hydriodic acid, the oxalate catalysis is more concerned with the chromate than with the hydriodic acid. This idea received further support from our recent observation² that the reaction between dichromate and hydrobromic acid is also catalysed by oxalate.

Full details will be published elsewhere.

Andhra University, C. R. VISWANADHAM.
July 6, 1943. G. GOPALA RAO.

1. Viswanadham, C. R., and Gopala Rao, G., *Curr. Sci.*, March 1942, **11**, No. 3, pp. 102-103. 2. *Ibid.*, June 1943, **12**, No. 6.

A NEW STEM-BASE DISEASE OF *ALTISSIMA* CAUSED BY A SPECIES OF *PHYTOPHTHORA*

For the first time during the year 1930 *Phytophthora* was reported¹ by this section to cause diseased lesions on the stem of *altissima* (*Hibiscus sabdariffa* Lin. var. *altissima*). *Altissima* supplies the Roselle Hemp of Commerce, and is noted for its good silky fibres, much stronger than jute and can be used in some proportion in the manufacture of ropes, cordage, etc.

The disease as observed since 1930 is characterised by the production of discoloured patches on the stem. If the stem is still green, the patch appears at first as a water-soaked, slightly yellow patch at the base of the stem; with time the lesion enlarges, darkens and becomes brown in colour and the infected tissues (the excambial layers) dry up resulting in shreds and cracks and thereby exposing the pith inside. Ultimately the leaves begin to wilt and the plants gradually dry up and die prematurely. In case they do not completely succumb, the fibres at the infected regions are damaged thereby depreciating greatly the quality of the yield.

The first infection usually takes place on the lower portion of the stem and more often near about the collar region; but the production of these lesions are confined within 2 to 3 feet from the ground level. The number of lesions in any single plant varies from a few to half a dozen and the size of the individual lesions from half an inch to many inches in length and may partially or completely girdle the stem. One or more lesions may coalesce together to form diseased surface of considerable length. If rain or very humid conditions prevail for a number of days gums are sometimes seen exuding from old and large lesions; such conditions also favour the growth of fungus mycelium from the margins of these spots.

The plant may be attacked at any stage of

its growth—from seedling till when almost full grown. But the attack and the spread of the disease is much favoured by the continued presence of damp, cloudy days or rains. Once started the lesions grow on and are not much hampered in their progress despite changes in weather conditions. But it must be stated that few new infections take place under dry conditions.

Cultures of diseased tissues as well as inoculation experiments have demonstrated that the pathogen responsible for this malady is a species of *Phytophthora*. This species of *Phytophthora* produced good growth of mycelium as well as sporangia in potato-dextrose-agar medium. The sporangia are ovoid in shape, measuring from $19.2-48\mu \times 18.0-33.6\mu$ with papilla $4.8-7.2\mu$; vegetative hyphæ varying from $4.8-9.6\mu$ in width.

Detail work regarding the specific identification of the fungus, its physiological behaviours together with control measures are in progress.

Our thanks are due to Dr. S. Hedayetullah, for his kind interest.

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June 11, 1943.

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1. *Ann. Rept. of the 1st Economic Botanist to Govt. Bengal, for the year 1930-31* (*Abs. Rev. Appl. Myco.*, 1931, 11, 157-58).

KARNAL BUNT, AN AIR-BORNE DISEASE

In a recent paper¹ I have shown that the bunt of wheat caused by *Neovossia indica* (Mitra) Mundkur is not a seed or soil-borne disease, experiments conducted during four years having given consistently negative results. These experiments have been repeated in 1942-43, not only at New Delhi but at Simla and at the Tarnab Farm, Peshawar, but with uniformly negative results. In the crop year 1941-42, bunt appeared in an epidemic form and at Karnal, up to 35 per cent. of the ears were infected. Seed from that crop was sown in the same fields in 1942-43 and the crop carefully examined. There was little or no bunt and only nine infected ears were found after careful search. These additional data further confirmed the belief that Karnal bunt is not seed or soil-borne. It will be noted that the experiments were designed with the idea that this bunt like a majority of bunt and smut diseases is a systemic disease, infection taking place in the seedling stage. Examination of a large number of ears attacked by *Neovossia indica* and of some attacked by *Tilletia caries* (DC.) Tul. or *Tilletia foetida* (Wallr.) Liro, has shown that such is not the case.

Plants infected by *Tilletia caries* or *Tilletia foetida* are sometimes dwarfed and bluish green to greyish green. The bunted ears are darker green and remain so longer than the normal heads. Attacked plants may be wholly or partially bunted. Even though a majority of the heads are completely attacked, partially attacked heads are known, half the ear or one side or one edge alone being infected. In a partially bunted head the bunt balls and the

kernels are not distributed irregularly; in fact, the former stand by themselves one above the other in a regular manner. McAlpine,² while granting that partially bunted kernels are exceedingly rare, has on some occasions found them. Recently Gassner³ found that in Turkey wheat kernels partially infected by *Tilletia foetida*, are more common but their mode of occurrence makes it clear that initial infection must be from an internal systemic mycelium.

As a rule the fungus attacks each growing-point of the stool at an early stage but some tillers may escape infection, the later ones not succeeding in escaping, so that partially bunted plants result. Sometimes the fungus may be confined to a part of the meristem, resulting in a strand of infected tissue below the growing point and a bunted strip along one side of the head alone. These are, however, extremely rare cases.

As against these symptoms, the plants infected by *Neovossia indica* are never dwarfed nor is their colour changed. An ear in which all

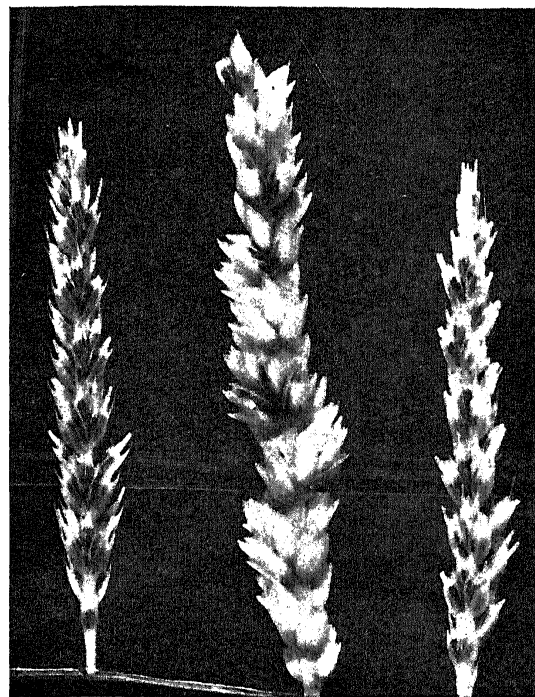


FIG. 1

Tilletia caries on right, *Neovossia indica* in centre and *Tilletia foetida* on left.

the grains are infected has not yet been seen. Not more than five or six kernels in a head are attacked, of which one or two are turned into complete smut balls, the rest of the attacked kernels being partially attacked. The remaining kernels in the head are unaffected. The attacked kernels occur very irregularly and do not conform to any ordered arrangement; in fact the kernels at the base may be perfectly healthy but two or three at the centre and a few at the apex may be affected. The mode of attack of the kernels makes it manifest that initial infection must have been external. Such a condition is the rule rather than an exception in this bunt. Examination of bunted ears indicates that *Tilletia caries* and *Tilletia foetida* are ovaricolous and *Neovossia indica* is fructicolous. Furthermore, the irregular manner of occurrence of infected kernels in the latter indicates that only those grains are infected where the spores brought