

Average yields of crops in maunds per acre (1 maund = 82 lbs.)

	Karnal			New Delhi		
	1941-42	1942-43	1943-44	1941-42	1942-43	1943-44
Wheat { Flooded ..	14.88	19.91	17.12	..	9.02	5.07
Wheat { Rainfed ..	5.45	17.41	9.92	..	9.20	2.75
Barley { Flooded ..	17.39	17.52	34.66	..	26.21	9.84
Barley { Rainfed ..	9.94	16.60	16.52	..	22.83	12.07
Gram { Flooded ..	15.94	17.50	16.88	7.50	10.76	7.34
Gram { Rainfed ..	0.97	14.71	13.40	3.32	10.45	3.22

water which now runs to waste in the sea. By flooding the land once only in early September, when plenty of surplus water is available, and without any further irrigations, the yields obtained during the last three years have been given in the above table.

The differences in yields are apparent in 1941-42 and 1943-44, but in 1942-43, a year of heavy monsoon rainfall (32.7 inches at Karnal and 26.9 inches at New Delhi), the differences are, as may be expected, of a lower order.

Growth of deep-rooted grasses in the grazing areas can be assured in years of deficient rainfall by the use of the surplus water which is now wasted. Canalization of the areas to use this water coupled with measures to conserve rainfall would assure the *kharif* crop completely and would result in the stabilization of *rabi* crop production on a higher level in these precarious areas.

Imperial Agricultural Research
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April 22, 1945.

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PREVENTION OF DAMAGE TO STORED POTATOES BY THE POTATO TUBER MOTH

IN *Current Science*,¹ Rahman published some results of his experiments on the storage of potatoes and damage by the tuber moth, *Gnorimoschema operculella* Zell. In view of the seriousness of the tuber moth problem nearly all over India, the problem has been re-examined.

The results given by Rahman show:—

- (1) marked difference in moth damage between covered and uncovered potatoes;
- (2) little significant difference in damage covered by the seven materials used, either by moth or by rot;
- (3) none of the seven materials used, has any superiority, in preventing rotting;
- (4) the figures for moth damage in respect of covered potatoes on the racks and on the *pucca* floor are too erratic to lead to any definite conclusion.

Rahman's statement, therefore, that the percentage of losses due to moth attack as well as rotting was higher when potatoes were stored on the floor than when they were stored on racks and that saw dust, Lantana leaves, local grass and *bhusa* gave good results, is not borne out by his data. Indeed

his only finding appears to be the well-known fact that covering potatoes with some suitable material minimises moth attack.

Lefroy and Evans (1910) experimented on potato storage at Pusa; these were repeated in certain areas in the Central Provinces. They concluded that the most effective and inexpensive method of storing potato against moth attack and rotting, was to keep them covered under a layer of sand and to examine periodically, specially during the rainy season, and pick out the attacked or rotting potatoes. This method has given varying degrees of success, depending, it appears, largely on the correctness and efficiency with which the method has been practised.

Following Rahman's clue, a laboratory experiment was conducted at Cawnpore in which lots of 16 potatoes were kept covered with sand, ash, saw dust, *bhusa*, ash mixed with lime, Lantana leaves and *Murraya koenigii* leaves, together with one lot uncovered as control and exposed equally to the tuber moth attack. The experiment lasted from 14-9-1944 to 2-3-1945. The results have shown that potatoes, covered with sand, ash and ash mixed with lime, remained completely free from moth attack while other lots suffered heavily. The percentage of moth-attacked and rotten potatoes under Lantana leaves was 91.0 and 47.9 respectively against 0.0 and 8.3 under sand and 0.0 and under ash. The experiment is being repeated on large-scale and a full account of both may be published at a later stage.

Entomologist to
the Government of U.P.,
Cawnpore,
March 28, 1945.

K. B. LAL.

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THE CHROMOSOME NUMBER OF SACCHAROMYCES CEREVISIAE

AFTER a survey of our knowledge of the cytology of yeasts Kater¹ concludes that while amitosis is of doubtful value as a process occurring during budding "the burden of proof still rests with both sides". We would like to add that an explanation should also be given as to why the chromosome number is given by Badian²

as two, by Sinoto and Yuasa³ as four and by Kater¹ as probably eight. Badian is criticized (Guilliermond⁵) on the ground that his diagrammatic illustrations do not fit in with his own or Guilliermond's photomicrographs. Our uniform and consistent results⁶ indicate that for the strain (S.C. 9, N.C.T.C.) investigated by us the chromosome number is two. This raises the question whether the different chromosome numbers given by various authors may not be due to studies of different races passing under the name of *S. cerevisiae*? The numbers given by Sinoto and Yuasa and Kater are multiples of that given by Badian. Were they dealing with tetra and octoploids? If so, the results are not strictly comparable.

The previous workers must have seen what they described. Kater¹ while referring to his previous work on yeasts considers that since his success depended "to a certain extent on accident" it could not form the basis for a general acceptance of the conclusion by all workers until others manage to duplicate the results⁷.

We have tried Bouin-fixation and subsequent staining with Heidenhain's hæmatoxylin and find that the above technique reveals the two chromosomes seen in Carnoy-iron-hæmatoxylin preparations. It is not at all necessary that the cells should contain picric acid. Smears treated in the usual way would give good pictures of the chromosomes if the following precautions are taken.

- (1) Use of wort cultures.
- (2) Control of cultures in such a way that all cells are almost at the same phase of development.
- (3) Experimental determination of the time of division.
- (4) Fixation of wet smears.
- (5) Long staining with iron-hæmatoxylin.
- (6) Careful differentiation.

Our results suggest that the "accident" mentioned by Kater¹ is not the delicate balance between the dye and the acid but that the cells should be at some phase of the mitotic cycle. We cannot also agree with Henrici⁷ that "descriptions of details in morphologic structures less than 1μ in diameter should always be taken *cum grano salis*", since in our preparations no other structure is present in the cells to complicate the picture seen.

Why is it then, that even after filling up the "possible leak" in Kater's technique we see only two chromosomes, while Kater gives the number as possibly eight? Under the belief that Badian, Sinoto and Yuasa and Kater have been using different strains we carried out some experiments with acenaphthene. Polyploidy could be induced and on cytological examination of wort cultures after a few hours' treatment with the above chemical, one finds in every field cells with varying chromosome numbers. It appears, therefore, possible to produce a tetraploid or octoploid by controlling the time of treatment with acenaphthene. One curious fact which emerged from the preliminary experiments was the observation that the measurements of the chromosomes of the tetraploids need not agree with that of the diploids. Viewed in the light of

the above discovery, it appears probable that different observers have been investigating different races passing under the name of *S. cerevisiae*! If the above contention is substantiated, much of the genetical work on yeasts may have to be revised in the light of new facts revealed by cytology.

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Indian Institute of Science,
Bangalore,
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M. K. SUBRAMANIAM.
B. RANGANATHAN.

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ON THE PRESENCE OF AN OBTURATOR IN THE OVULE OF *PHYLLANTHUS NIRURI* L.

IN a short note on the development of the embryo-sac of *Phyllanthus niruri*, Maheshwari and Chowdry³ (1937) reported the occurrence of a normal eight-nucleate megagametophyte when some previous workers had reported a five-nucleate one. Incidentally we also recorded the presence of an obturator in the ovule—a fairly common occurrence in Euphorbiaceæ. Recently Banerji and Dutt² (1944), in a work dealing with the development of the female gametophyte of *Putranjiva*, *Trewia*, *Euphorbia* and *Phyllanthus*, agree that the embryo-sac is eight-nucleate but report their failure to find an obturator either in *P. niruri* or *P. urinaria*, and suggest that Maheshwari and Chowdry probably mistook "the nucellar beak of the second ovule for an obturator". It is added that "in longitudinal sections, the nucellar beak of the second ovule sometimes gave the appearance of an obturator but close examination always revealed its true nature".

Since this is quite contrary to our observations and as the old slides on which the original study was based were no longer available for study, I sectioned some material of *P. niruri* collected from Dacca and am able to confirm our original statement that an obturator is clear and unmistakable. This is in agreement with the previous observations of Arnoldi¹ and others made several years ago on *Ceramanthus* (= *Phyllanthus*) (see Schnarf,⁴ 1929, for literature). I am unable to offer any explanation as to why the obturator was missed by Banerji and Dutt² in their sections, but presume that their observations were made on non-median sections.

It may, therefore, be concluded that an obturator is present in *P. niruri* and is very