cuticular longitudinal appendages directed backwards. The œsophagus ends in a rounded bulb with valvular apparatus. The caudal extremity

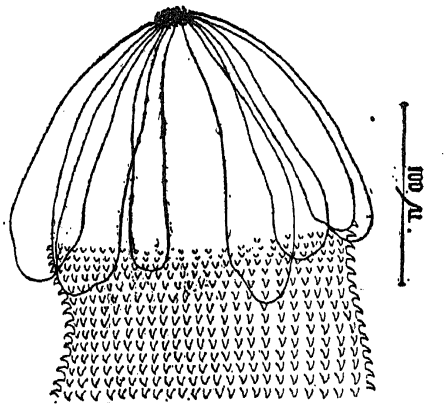

FIG. 1

Indiana gryllotalpæ. Female. Anterior extremity

terminates abruptly in a narrow spike. The cuticle, except on the caudal spike, is beset with distinct spines arranged in close-set transverse rows. The cuticle on the anterior end also appears to be devoid of spines. The spines are directed backwards and those on the posterior part of the body are larger than others. The eggs are oval and thick-shelled.

The worms under report, however, cannot be identified with any genus founded by Basir, nor with any other known nematode genus, a new genus and a species to accommodate it, appears necessary.

The detailed description of the worm will be published later.

Zoological Laboratory, G. K. CHAKRAVARTY.
University of Calcutta,
June 29, 1943.

* Basir, M. A., *Recd. Ind. Mus.*, Calcutta, 1942, **44**, Pt. I, pp. 95–106.

EFFICIENCY OF SOME SAMPLING METHODS FOR WHEAT CROP

SAMPLING saves much time, labour and expense in getting information regarding yield, relative value of different varieties with different manures for crops spread over extensive areas. But the sampling problem is a difficult one, because the method differs from crop to crop, place to place and even from field to field. The sampling procedure depends mainly on the material to be sampled. If the material is homogeneous, the procedure is comparatively simple; but in case it is heterogeneous complicated methods will have to be devised for taking the samples.

It is known that the error variance of the estimated value on the basis of the unit of sampling is $\left(1 - \frac{n}{N}\right)\frac{s^2}{n}$;[1] where N is the total number of units in which the whole area can be divided, n is the number of units actually sampled and s^2 is the variance between the units. Again the percentage loss of information due to sampling in any experiment is $(1-q)\frac{B}{A}\times 100^2$; where q is the proportion sampled from each plot, B is the variance between the sampling units within the plots, and A is the variance between the plots. The above formulæ show that the efficiency of a sampling method depends on (*i*) the proportion sampled, (*ii*) the variance between the sampling units. As the variance between the units depends on their size, the size also should be such as to have a low coefficient of variation for that particular size.

Many workers[3,4] have tried to arrive at the best method of sampling by the aid of the criterion mentioned above. Their conclusions are based mostly on the results of a few experiments from plots ranging from 1/17th to 1/5th of an acre. For rice, Hubback[5] has arrived at some general conclusions from data collected over extensive areas. But no attempt has been made to judge the efficiency of different methods of sampling by any intensive work. In this note we have dealt with the efficiency of a few sampling methods with reference to wheat on the basis of the Karnal wheat uniformity trial data, which has been published in full in a previous publication.[6]

The whole area 1·1478 acres consisting of two thousand 5′ × 5′ plots (25 rows × 80 columns) was divided into four equal parts or blocks each having five hundred plots (25 rows × 20 columns). From each of these portions sampling was carried out on 1 per cent., 2 per cent., 5 per cent. and 7 per cent. basis by the following three methods: (1) Selecting 5′ × 5′ ultimate plots at random; (2) forming composite samples of 125 sq. ft. by adding the yields of five ultimate plots selected at random; (3) selecting an area of 125 sq. ft. adjoining and round about an ultimate plot taken at random. Each method of sampling was repeated twenty-five times. It will be noted that the whole area was sampled 300 times (25 samples × 3 methods × 4 percentages).

Tables I, II and III give the mean values of (*i*) the estimates, (*ii*) the variances within blocks and (*iii*) the percentage loss in efficiency with their standard errors based on the twenty-five samplings. Table IV shows the standard error of the differences between the estimated and the actual values on the basis of the standard deviation without taking the blocks into consideration.

TABLE I

Mean of sampling estimates in ounces for 125 sq. ft. for different sampling methods

Method of sampling	1%	2%	5%	7%
1st method	84·6 ± ·43	84·0 ± ·48	84·4 ± ·24	84·4 ± ·25
2nd method	83·2 ± ·78	84·8 ± ·42	84·8 ± ·29	86·6 ± ·61
3rd method	84·4 ± ·63	84·4 ± ·71	85·3 ± ·45	84·8 ± ·37

TABLE II

Mean variance within blocks for different sampling methods

Method of sampling	1%	2%
1st method	206·8 ± 16·0	230·6 ± 10·7
2nd method	*	29·2 ± 3·1
3rd method	*	149·8 ± 24·4

Method of sampling	5%	7%
1st method	222·2 ± 6·4	222·2 ± 6·2
2nd method	45·6 ± 2·4	99·6 ± 15·8
3rd method	131·9 ± 9·2	104·1 ± 4·1

* There was only one sample in each block.

TABLE III

Percentage loss in efficiency for different sampling methods

Method of sampling	1%	2%	5%	7%
1st method	57·8→7·1	58·7±5·5	30·8±3·1	24·7±3·4
2nd method	*	43·3±6·4	33·4±3·1	43·4±6·5
3rd method	*	72·4±5·8	63·7±5·6	47·9±5·4

* There was only one sample in each block.

TABLE IV

Standard errors of the estimates for different sampling methods

Method of sampling	1%	2%	5%	7%
1st method	2·16	2·36	1·16	1·20
2nd method	3·89	2·09	1·40	2·92
3rd method	3·11	3·53	2·20	1·80

An examination of the above tables leads to the following conclusions:—

(1) The averages of the estimates are almost the same for the various methods of sampling. The standard error of these averages is for all practical purposes a minimum for the first and second methods of sampling on 5 per cent. basis.

(2) The variance within blocks is minimum for the second method of sampling on 2 per cent. and 5 per cent. bases.

(3) The percentage loss in efficiency is low for the first and second methods of sampling on 5 per cent. basis. It is also low for the first method on 7 per cent. basis.

(4) The standard errors of the estimates are comparatively low for the first and the second methods on 5 per cent. basis. It is low for the first method on 7 per cent basis also.

On the whole the present investigations indicate that 5 per cent. sampling by either the first or the second method is likely to give results with comparatively low error. The first method involves more labour for threshing than the second one and hence in actual practice the latter is preferable to the former.

Imperial Agricultural Research Institute, New Delhi, *May* 19, 1943. P. V. KRISHNA IYER. S. AZIZUDDIN AHMAD.

1. Wishart and Sanders, *Principles and Practice of Field Experimentation*, Emp. Cotton Growing Corporation, p. 44. 2. Yates and Zacopany, *J. Agri. Sci.*, **25**, 545. 3. Hudson, *Ibid.*, **29**, 76. 4. Kalamkar, *et al.*, *Curr. Sci.*, **5**, 533. 5. Hubback, *Agri. Res. Inst. Pusa Bull.*, No. 16. 6. Krishna Iyer, *Ind. J. Agri. Sci.*, **12**, 240.

SILURUS COCHINCHINENSIS C.V. FROM MYSORE STATE

COMMENTING on a collection of fishes from Kadur District, Mysore State, Bhimachar and Subba Rau[1] recently referred the species of *Silurus* found on the Western Ghats to *Silurus cochinchinensis* C.V. They pointed out that the variability found in the number of mandibular barbels in the species of *Silurus* is due to the absorption of one of the pairs with the growth of the fish and that it has no taxonomic significance. Based on this conclusion Day's *S. wynaadensis* was considered as a synonym of *S. cochinchinensis* C.V. Hora[2] considered this a valuable observation since it indicates the occurrence of one and the same species in Cochin-China, Southern China, Siam, Malay Peninsula, Burma, Assam, Eastern Himalayas and Peninsular India. This fish represents one of the important Far Eastern elements in the fish fauna of Peninsular India. Its occurrence on the Western Ghats is an important evidence in favour of the "Satpura Trend" theory of Hora.

There are two specimens of *Silurus cochinchinensis* C.V. in our collection of fishes recently made from the hill streams of Western Ghats about two and a half miles from Kottigehar. They were collected in a drainage draining towards the west and in association with *Nemachilus striatus* Day and *Bhavania annandalei* Hora. They measure 111 mm. and 70 mm. respectively in standard length. While the former has only a single anterior pair of mandibular barbels the latter has, in addition, a partially absorbed one of the posterior pair, that on the right side. The left posterior barbel is completely absorbed. This finding confirms the observation made by Bhimachar and Subba Rau.

Fisheries Section, Department of Agriculture, Bangalore, *August* 5, 1943. B. S. BHIMACHAR. AUGUSTINE DAVID.

1. Bhimachar, B. S., and Subba Rau, A., *Journ. Mysore Univ.*, 1941 (B). 2. Hora, S. L., *Rec. Ind. Mus.*, 1942, **44**, Part II, 193.