Gynura crepidioides Bth.—A Recently Introduced Weed in S.E. Asia.

As far as I am aware this Gynura has been only mentioned for S.E. Asia in the Suppl. (6th Vol.) of the *Handbook of the Flora of Ceylon* by Alston in 1931. He says of it: "Recently introduced but now a very common weed in cultivated ground in Ceylon." In Netherlands India it must have been introduced into Sumatra (East-coast Residency) about the same time, *viz.*, in the year 1926. Jochems[1] reported it for the first time from the vicinity of Medan. Probably it has found its way from Africa, where it is indigenous, to Ceylon and from there to Sumatra. In a few years it has spread over the whole of Sumatra and Java; in the latter island it has been purposely introduced from Sumatra by tea-planters. It is astonishingly common and is now far more common than *Erechthites valerianifolia* and *E. hieracifolia* together, which were introduced at a much earlier date in the nineteenth century. Its dispersal rapidity is quite astonishing and is not surpassed by any other introduced weed; single plants are found along paths and in clearings at remote places. It occurs from sea-level up to more than 3,000 m. altitude. A history of its dispersal I have given elsewhere.[2] It has now reached also the S. corner of Celebes.[3]

From both species of Erechthites mentioned above it can be easily distinguished by its drooping, red-brown heads.

The first record from the main land of S.E. Asia is, as far as I am aware, a plant found in Southern Annam, in the vicinity of Dalat, of which the Buitenzorg Herbarium received a duplicate, distributed under the name *Erechthites hieracifolia*, collected by Mr. R. W. Squires, No. 797, March-April 1932, on a sandy river bank. The identification is wrong, the specimen belongs to the said *Gynura crepidioides* Bth. I am sure that the plant is rapidly spreading in S.E. Asia and this note is intended to attract the attention to this remarkably eurytopic weed.

C. G. G. J. VAN STEENIS.

The Herbarium, Botanic Gardens, Buitenzorg, Java, N.E.I.
June 18, 1938.

[1] *Trop. Natuur*, 1931, **20**, 5.
[2] *Natuurk. Tijdschr. Ned. Ind.*, 1936, **96**, 132.
[3] *Trop. Natuur*, 1938, **27**, 95.

The Distribution of Krishna Iyer's "Mean of Fisher's t^2".

MR. P. V. KRISHNA IYER has published a rejoinder[3] to my comments[2] on his paper "The Distribution of the Mean of Fisher's t^2 for Samples from a Normal Population".[1] Referring to the distribution of t^2 in the case of samples of unequal sizes Mr. Iyer states in the last sentence of his reply: "The distribution of this mean, as it involves only $(p-1)$ independent comparisons can be taken to be the one shown in the paper", and in fact the whole point in his argument lies in this sentence. Unfortunately this statement is incorrect as can be easily proved.

Let me begin by re-stating the problem. We have p samples of sizes: $n_1, n_2, \cdots, n_p$, and means: $\bar{x}_1, \bar{x}_2, \cdots, \bar{x}_p$, respectively, coming from an unknown normal population. Let s_1^2 denote the variance estimated from 'within samples' with $N - p$ degrees of freedom, where $N = n_1 + n_2 + \cdots + n_p$.

Mr. Iyer considers the expression

$$\frac{2}{p(p-1)} \cdot \frac{1}{s_1^2} \cdot \sum_{s=1}^{p-1} \sum_{r=s+1}^{p} \frac{(\bar{x}_r - \bar{x}_s)^2}{\frac{1}{n_r} + \frac{1}{n_s}} \quad \ldots (1)$$

which is the mean of all [$\frac{1}{2} p(p-1)$ in number] t^2's that can be formed, and denotes it by $\bar{t}^2$. Writing Fisher's 'Ratio of Variances' as w we have

$$w = \frac{\sum_{i=1}^{p} n_i (\bar{x}_i - \bar{x})^2}{(p-1)\, s_1^2}, \text{ where } \bar{x} = \frac{\sum_{i=1}^{p} n_i \bar{x}_i}{N} \quad \ldots (2)$$

The distribution of w is known to be

$$\text{Const.} \frac{w^{\frac{p-3}{2}}\, dw}{|(N-p) + (p-1)w|^{\frac{N-1}{2}}} \quad \ldots (3)$$

It can easily be seen that $\bar{t}^2$ is identical to w when $n_1 = n_2 = \cdots = n_p$ and not otherwise. The distribution of $\bar{t}^2$ can be derived from that of w only in this case of equal-sized samples. But Mr. Iyer believes that the t^2 of the 'unequal case' has the same distribution as t^2 of the 'equal case', that is to say, the distribution in the former case is same as (3).

Without troubling about the distribution of so cumbrous an expression as (1) it will be enough if we consider the first two moments of (1) given below:—

$$\left.\begin{aligned}\mu_1(\bar{t}^2) &= \frac{N-p}{N-p-2}\\ \mu_2(\bar{t}^2) &= \frac{2(N-p)^2}{(N-p-2)(N-p-4)}\left\{\frac{N-p-1}{N-p-2} - \frac{(p+1)(p-2)}{p(p-1)}\right.\\ &\qquad \left. + \frac{8}{p^2(p-1)^2}\,\Sigma\frac{n_j\,n_k}{(n_i+n_j)(n_i+n_k)}\right\}\end{aligned}\right] \quad .. \quad (4)$$

where Σ is taken over all values from 1 to p of i, j, k in such a way that $i \neq j \neq k$.

From (3), on the other hand, we easily get :—

$$\left.\begin{aligned}\mu_1(w) &= \frac{N-p}{N-p-2}\\ \mu_2(w) &= \frac{2(N-3)}{(p-1)(N-p-4)}\cdot\left(\frac{N-p}{N-p-2}\right)^2.\end{aligned}\right] \quad .. \quad (5)$$

Comparing (4) and (5) we find that though the first moments agree, the second moments of $\bar{t}^2$ and w are entirely different. There can now be no doubt that the distribution of (1) is different from (3). [It may be noticed, however, that if we put $n_1 = n_2 = \cdots = n_p$ in (4) the two second moments coincide; this is as it ought to be because in this case $\bar{t}^2 \equiv w$.]

I can now recall my comments : " Mr. Iyer does not appear to have realised that nothing is known about the sampling distribution of what he calls $\bar{t}^2$ in the case of unequal observations. It is therefore absolutely useless for purposes of tests of significance."

K. Raghavan Nair.
Statistical Laboratory,
Presidency College,
Calcutta,
May 10, 1938.

[1] *Proc. Ind. Acad. Sci.*, (A), 1937, **5**, 528.
[2] *Curr. Sci.*, 1937, **6**, 290.
[3] *Ibid.*, 1938, **6**, 392.

Derris ferruginea Benth from Assam.

It was reported,[1] in a previous article entitled " Occurrence of *D. elliptica* in India ", that a species of Derris, at that time believed to be *D. elliptica*, was found in the plains of Assam. Later on, doubts arose as to its correct identity and consequently the matter was reinvestigated, with the result that the so-called *D. elliptica* of Assam has now definitely been established as *D. ferruginea* Benth (Kew concurring). These findings negative the occurrence of *D. elliptica* in India. The analytical results given previously, therefore, refer to *D. ferruginea* and are of additional interest in so far that the occurrence of rotenone in this species has not been recorded before.

This Indian species of wild Derris is sufficiently rich in rotenone (nearly 3 per cent.) and can be of value as an insecticide, both for home consumption and export purposes. Its distribution in Assam is, therefore, being published for the benefit of those interested in the commercial exploitation of this important vegetable insecticide.

Forest Division	*Localities*
Sibsagar ..	Kamalabari, Bakuba and Dikumer
Nowgong ..	Doboka Reserve
Lakhimpur ..	Elemgmora, Bartagaon, Panigoa Reserve
Khasi and Jaintia Hills ..	Umsaw
Goalpara ..	Haltugaon
Darrang ..	Charduar

S. Krishnan.
T. P. Ghose.
Forest Research Institute,
Dehra Dun,
June 29, 1938.

[1] *Curr. Sci.*, 1936, **4**, 857.