solution could be 'frozen' and agar 'isolated' in the usual way.

The recovered agar was found very suitable for bacteriological work on repeated tests. A 3 per cent. solution of this product was enough to give a film of good surface and consistency for the vaccine bottles. Normally a 4 per cent. concentration of commercial Japanese agar is required for this purpose.

The recovery was about 50 per cent.

D. G. Supply
Drugs and Dressings
Directorate,
New Delhi,
March 23, 1944.

B. S. Roy.
J. N. Ray.

A SIMPLE METHOD FOR THE MANUFACTURE OF AGAR-AGAR FROM *GRACILARIA LICHENOIDES*

The following gives a brief account of the simple process of preparation of Agar-Agar (B.P.) from sea-weed.

The dried sea-weed, *Gracilaria lichenoides*, a Rhodophyceæ, is washed free of sand and debris and soaked in a 1 per cent. HCl solution for 15 to 30 feet to remove encrusting and adhering calcium carbonate and washed in water until acid-free. After bleaching and drying in the sun, it is extracted in boiling water successively until the extract fails to jell on cooling. The extracts are combined, cooled to jell and the jelly so formed is cut up into small pieces, placed in a tall cylinder and roughly twice its weight of distilled water added, well mixed and left undisturbed for 48 hours, after which the excess water is strained through a muslin cloth. This process is repeated twice at 24-hour interval and finally the jelly is thoroughly washed and dried. The dried substance is Agar-agar.

The yield of Agar-agar is about 20 per cent. of the dry weight of *Gracilaria lichenoides*. Analytical data of Agar-agar prepared by this method, "Difco" brand Agar-agar, a standard product commonly used in biological laboratories as well as B.P. standards are given below for comparison:

Heads of analysis	Average of several samples	"Difco" Brand	B.P. Standards
	%	%	%
Moisture ..	16	17·48	Not more than 18
Nitrogen ..	0·17	0·22	..
Ash ..	3·60	3·0	Not more than 5
Insolubles ..	0·5	..	,, 1
Setting power	1·0	1·5	,, 1

P. D. Karunakar.
M. S. Raju.
S. Varadarajan.

Government Agricultural Chemist's
Section, Agricultural Research
Institute, Lawley Road P.O.,
Coimbatore,
March 13, 1944.

A NEW SYSTEM OF SOIL NOTATION FOR COMPARATIVE STUDY OF SOIL CHARACTERISTICS

The development of pedology as a science is of recent origin and several systems of soil classification have been put forward. Most of these have been evolved to survey large areas of land on basis of climate, genetic evolution, geological formation, soil colour, crops generally grown, etc., and have probably little practical value, as the variations within the groups so evolved are bound to be great. Soil survey of compact areas as opposed to general topographical surveys has, therefore, its own problems. If the survey is to be of any practical use, the number of samples to be analysed have to be very large and, therefore, the detailed chemical, mechanical and biological analyses have to be abandoned and a simple and effective method of evaluating the factor of primary importance has to be devised. In the revenue classification of soils in this country, the colour of the soil and incidentally soil texture are the only factors used for differentiating soils according to their relative yielding capacities. The texture of the first few inches of the soil and in some places, as in Bombay-Deccan, the depth of the soil over the basic rock are taken into consideration. The primary limitation of soil studies to the surface layers have, however, been rightly modified by recent workers who have shown that profile studies of soil horizons to a depth of three to five feet are very essential to soil classification. A concrete example of how the sub-soil can affect the quality of crops is afforded when the "mail" and "non-mail" rice tracts of Sind are compared. The mechanical analysis of the top layer is of the same order but in the "non-mail" tracts the sub-soils from one to two feet and two to three feet are decidedly sandy as compared to "mail" tracts thus accounting for the inferior quality of rice grown in these tracts. Further, it is now recognised that the field behaviour of a soil is more truly reflected by its aggregate analysis than by an ultimate analysis after mechanical dispersion involving the use of chemicals which act on the soil mass.

The present methods of expressing the different soil characteristics are far from satisfactory as they do not often lend themselves to easy adoption in practice. Thus the orthodox method of giving the values of mechanical analyses to two places of decimal is cumbersome while grouping soils as sand, loam, clay loam, sandy loam, etc., makes only a vague classification. A system of presenting the data of aggregate or mechanical analysis that may commend itself to field workers would be to round off the percentages of sand, silt and clay for each soil horizon to their nearest tens, and after eliminating the end zero, combine them to give a three figure number, which would denote the particular horizon. Thus at a glance it is possible to grasp the approximate textural composition of the soil and compare it with others without confusion. A number like 721 would, for instance, denote that the soil has 65 to 74·9 per cent. sand, 15 to 24·9 per cent silt and 5 to 14·9 per cent. clay. The advantages of this representation are obvious.

This system of representation is elastic and any other data of importance could be associated with the index by appropriate number or alphabet. Thus the influence of climate can be incorporated with the soil index showing the textural composition. It has been shown in this laboratory that Meyer's factor, *viz.*, rainfall divided by absolute saturation deficit of the air, the latter being given by the formula:

$100 -$ Relative humidity$/100 \times$ Mean vapour pressure (m.m.),

calculated from the meteorological data of research stations distributed all over India brings out the climatic variations and conforms with the climatic classification for soils into arid, semi-arid, humid, and per-humid zones. If this single value climatic factor is associated with the numerical index of soil texture the information conveyed by the index is greatly augmented. For associating the Meyer's factor it is modified by rounding to the nearest ten and eliminating the last zero so that brevity, so essential in such numeric representation, could be maintained.

In addition to the association of Meyer's factor with the index, the colour classification of the soils can also be associated likewise. Without attaching much importance to fine variations, the soil colours may be classified into the following groups, of which the initial letter or letters may usefully be associated with the numerical index: (1) Red (R), (2) Black (B), (3) Grey (G), (4) Brown (Br) and (5) Yellow (Y).

The following table gives the results of analysis of a few typical soils from various research stations together with an expression, in the last column, of these results by the above nomenclature. It may be seen that the comparative evaluation of soils is made simple by the adoption of the proposed system.

Locality	Aggregate analysis			Meyer's factor	Soil index
	Sand	Silt	Clay		
Black soils—					
Akola ..	39·6	40·4	0·0	141·4	B. 442·14
Labhandi ..	34·6	48·6	16·8	237·2	B. 352·24
Hagari ..	39·6	32·5	27·9	91·3	B. 433·09
Padegaon ..	35·2	38·4	26·4	132·3	B. 443 13
Red soils—					
Ranchi ..	60·2	31·7	8·1	318·1	R. 631·32
Taliparamba ..	52·1	31·3	16·6	753·9	R. 532·75
Coimbatore .	67·2	20·0	12·8	162·0	R 721·16
Sirsi	[illegible]2·7	21·8	5·5	666·5	R. 721·67
Grey soils—					
Delhi .	72·9	19·6	7·5	123·7	G. 721·12
Kangra ..	59·5	34·8	5·7	676·0	G. 631·68
Shahjahanpur ..	81·6	15·6	2·8	205·3	G. 820·21
Karimgang ..	40·6	51·6	7 8	132·8	G. 451·13
Chinsuri ..	18·[illegible]	62·8	8·5	426·6	G 202·43
Samalkot .	65·9	23·4	10·7	223·0	G. 721·22
Tabiji ..	90·2	7·4	2·4	110·2	G. 910·11

It is possible, on the same basis, to work out chemical indices for soils. Thus a soil containing 42 mgm. of N, 54 mgm. of P_2O_5 and 200 mgm. of K_2O could be represented by $N_4P_5K_{20}$ which would be a very suitable index for comparative purposes. Similarly, values for soil reaction and exchangeable bases can also be suitably abbreviated and added to this index wherever these values are known to influence crop yields.

The system of notation suggested here can be improved upon or modified to suit the individual problems of the soil surveyor. An agreed notation on these lines would greatly help in comparative soil studies and ultimately in all soil-crop relationships.

Imperial Agricultural Research Institute, New Delhi,
March 20, 1944.

S. V. Desai.
N. D. Vyas.
K. C. Batra.

MANUFACTURE OF GLAND PRODUCTS

The interesting article by Prof. B. B. Dey and his associates[1] has brought out much useful information which has a bearing on the utilisation of gland products under Indian conditions.

We have collected considerable amount of data bearing on the utilisation of pituitary and other glands, but owing to certain technical considerations, we are precluded from publishing all the related details.

Pituitary Gland

During the past fifteen months, we have processed pituitaries from about two lakhs of animals. We have further built up an organisation which is now dealing with a number of slaughteries and is handling about 20,000 glands per month.

We have concentrated chiefly on the beef glands, which are the only ones of practical value, particularly for the manufacture of post. pituitary powder. In our experience, the average weight of the glands varies from place to place in India, being dependent on the size of the animals which, in turn, is dependent on soil and climatic conditions. Thus, in a Western India centre, the average pituitary weighs over 2 grams, whereas at a South Indian centre, glands weighing less than 0·8 gram each are obtained. Irrespective of the location of the centre, one occasionally comes across a gland in which either the posterior or the anterior lobe preponderates.

In actual production, the average ratio of the separated posterior lobe to the residue (chiefly representing the anterior lobe) works out to about 1: 5. This is largely because some of the posterior lobe is left behind in the dissection. A certain amount of skill and speed is required in the manipulation because, after some time, the line of demarcation between the two lobes becomes rather blurred.

Experience has shown that a great deal of the earlier theory and practice in regard to the handling of the gland material, as also some of the concepts in regard to the stability of the hormone components, require revision. The active principles are comparatively stable, but there is apt to be much loss in handling. It is