

# ON THE FOREST TYPES IN INDIA

BY

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The term India is here used in its broadest sense and includes any neighbouring lands, such as Burma, which are under the authority of the Government of India.

It may be stated at the outset that work in India on the lines followed by Professor CAJANDER is, as yet, in its infancy and there is a complete absence of any literature containing detailed conclusions such as has appeared from the pens of various authors who have studied European forests. In some provinces the absence of local floras is a serious handicap, whilst the richness of the vegetation in the tropical and subtropical portions of the empire is sufficient to deter any but the most enthusiastic from undertaking the study on a scale sufficiently intensive to yield conclusive results.

The classification of forests by Forest Officers has in the past been carried out, I believe I am correct in saying, exclusively with reference to that portion of the forest which primarily appeals to a Forest Officer, namely, the upper storey or storeys of trees wherever such exist.

Shrubs have not been used as a basis of classification except in those special types where shrubs, grasses or herbs predominate to the total or partial exclusion of tree growth. But though shrubs and grasses have not been used as a basis of classification of forest types, yet observers in various parts of India have from time to time attempted to correlate the presence or absence of individual species of shrubs or grasses with the existence of a forest type already predetermined according to its dominant tree species. Observations of this nature will undoubtedly form a starting point from which the study may be enlarged along the lines followed by CAJANDER. It is only necessary to transform each of these »indicator» species into a forest type and study intensively the new types thus formed in

order to decide whether they are suitable as a basis for new forest types analogous to those adopted by CAJANDER.

I propose therefore to enumerate very briefly some observations made on indicators. Observations have been mainly centred in Burma and the sub-Himalayan tract of the United Provinces and Bihar.

In Burma Professor R. S. TROUP (1) states that bamboos form reliable soil indicators. *Bambusa polymorpha* and *Cephalostachyum pergracile*, in its more luxuriant form, are quoted as reliable indicators of ground on which teak (*Tectona grandis*) will flourish, while *Dendrocalamus strictus* is said to be characteristic of the drier types of teak forest as well as of regions too dry for teak. Similarly all the species of bamboo found in the forests of Burma are considered to possess value as indicators.

Mr. L. D. STAMP (2) says that most types of forest in Burma, from the evergreen dipterocarp to the dry deciduous, may after interference by man be replaced by bamboo forest and the dominant species are often the same as the dominant bamboos in the neighbouring virgin forest. To illustrate his point he mentions that good teak is often accompanied by *Bambusa polymorpha* and the presence of brakes of this bamboo is very often indicative of conditions especially suitable for teak. He further remarks that — — —

*Bambusa polymorpha* replaces *Xylia dolabriformis* and moist teak forests.

*Melocanna bambusoides* and *Oxytenanthera albo-ciliata* replace evergreen dipterocarp forests.

*Dendrocalamus hamiltonii* replaces evergreen forest.

*Dendrocalamus strictus* replaces dry teak and other drier types of forest, the bamboo being seldom absent from the dry teak forests.

In the sub-Himalayan tracts occupied principally by *s a l* (*Shorea robusta*) Mr. R. S. HOLE (3) was the first to make a detailed study of soil indicators, and his researches were practically confined to grasses. He developed the idea of parallel types of woodland and grass-land and considered that for almost all forms of grass-land there was a

corresponding form of woodland capable of thriving under similar conditions of environment. Thus, when a type of grassland such as *m u n j* (*Saccharum Munja*) savannah had been replaced by a parallel type of woodland i.e. dry miscellaneous forest of *Acacia Catechu*, *Dalbergia Sissoo* and others, he regarded this as parallel succession in which he did not recognise regressive or progressive changes.

He considered that grasses were particularly valuable as indicators in deciding whether a particular locality was suitable for a particular tree species and stated that a careful study of the grasses in forest blanks often indicated whether or not the conditions of soil and moisture were such as to render possible the afforestation of such blanks with a particular species.

HOLE's researches were confined to the area lying between the Ganges and the Jumna which approaches the western limit of the *s a l*. Briefly stated, his conclusions were that — — —

*Saccharum Munja* is dominant in localities suitable for dry miscellaneous forest containing a large variety of trees such as *Acacia Catechu*, *Hombax malabaricum* and *Zizyphus zujuba*.

*Saccharum Narenga* is dominant in localities suitable for *s a l* forest.

*Erianthus Ravennæ* is dominant in localities suitable for moist miscellaneous forest composed of such species as *Terminalia tomentosa*, *Mallotus philippinensis* and *Trewia nudiflora*.

He also gave three other grasses as characteristic of the zerophilous type of soil chiefly found along the gravelly banks of stream beds, where *Acacia Catechu* and *Dalbergia Sissoo* often constitute the parallel woodland type.

The above research work by HOLE was followed up by TROUP (1) & (4). The latter confirmed HOLE's conclusions for the western sub-Himalayan tract and recorded certain additional observations all of which were intended to emphasise the importance of forest grasses as indicators of edaphic conditions, and thus indirectly also as indicators of soil suitable or otherwise to the growth of certain tree-forest types.

For the eastern sub-Himalayan tract, not dealt with by HOLE, he affirmed that — — —

a) On ground suitable for s a l the dominant grass is *Saccharum Narenga* with which occurs *Saccharum arundinaceum*, *Arundinella Clarkei*, *Erianthus fastigiatus* and *Andropogon Nardus*.

b) *Imperata arundinacea*, *Saccharum spontaneum* and *Anthistiria gigantea* though sometimes present with s a l may indicate soil insufficiently drained for s a l.

c) *Phragmites Karka*, *Erianthus elephantinus* and *Saccharum procerum* characterise savannahs unsuitable for s a l.

The foregoing summary shows that observers in India have hitherto concentrated their attention on grasses (especially the tall savannah grasses) and bamboos as being the best indicators of conditions suitable or unsuitable to a particular tree-forest type. Whether or no further research will prove that these grasses and bamboos can be satisfactorily used to differentiate the more exclusive and narrow forest types as defined by CAJANDER, is beyond our present knowledge. On the other hand I have for some months past been engaged in studying the composition of the shrubby undergrowth in a part of the western sub-Himalayan tract. These investigations are at present incomplete, and it would be premature to draw definite conclusions at this stage, but the results so far obtained by a detailed examination of the flora of 60 sample plots situated in s a l forest and originally chosen for statistical purposes suggest that *Clerodendron infortunatum* taken in conjunction with *Flemingia semialata* may possibly constitute a forest type of some use in the allocation of s a l forest to quality classes by eliminating the poorer classes. The theory that grasses may also be of value in differentiating forest types has also to some extent received confirmation during this investigation, since the grasses *Anthistiria gigantea*, *Imperata arundinacea* and *Saccharum Narenga* have all shown themselves to be indicators of better quality s a l forest.

It is hoped to carry on this investigation in the western sub-Hima-

layan tract until the suitability or otherwise of shrubs and grasses in the formation of forest types as defined by CAJANDER is beyond dispute for this particular region.

#### REFERENCES.

- 1) Aims and methods in the study of vegetation edited by A. G. TANSLEY and T. F. CHIPP. 1926.
- 2) The Vegetation of Burma by L. DUDLEY STAMP. 1925.
- 3) Indian Forest Memoirs Vol. I Part I by R. S. HOLE on some Indian forest grasses and their ecology. 1911.
- 4) Introduction to «The Silviculture of Indian Trees» by R. S. TROUP. 1921.