Multipurpose leguminous trees and shrubs for agroforestry*

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Abstract. These are various ways in which farmers deliberately incorporate trees and shrubs on farm production fields. Many of the species so incorporated are legumes. The role of such woody perennials in agroforestry systems can be productive and/or protective. Legumes offer by far the maximum range of choice of woody species for agroforestry in terms of their economic uses as well as ecological adaptability. In addition to the several leguminous woody species that are well known in agroforestry, there are many more whose potentials have not yet been fully understood. An evaluation is presented of the agroforestry potentials of a few leguminous species from the point of view of their growth characteristics, ecological adaptability, combining ability with other species and uses/functions. The science of agroforestry is still in its infancy. There exists no research data on the various management aspects of these potentially promising group of plants. ICRAF, in its capacity as an international research council, has assembled several multipurpose leguminous trees and shrubs of agroforestry potential at the Council's recently-established Field Station in Machakos, Kenya, primarily for demonstration and training purposes. Initial results from these trials are presented in the paper.

Introduction

Integrated land use systems that have now come to be called agroforestry have been in existence since very early times, in some form or other, in different parts of the world. But such systems and practices had hitherto been bypassed, if not neglected, by researchers and other experts and consequently have not been a part of the resource-rich farming. However, the trend is now changing, and these systems are now receiving scientific attention. Increasing dependance of modern agricultural technology on high-value inputs on the one hand, and the deteriorating economic situation of most of the developing countries on the other, have caused a renewed awareness about the productive and protective value of trees, and the realization of the potentials of age-old conservation farming technologies.

In spite of the tremendous amount of interest on agroforestry, quite a bit of confusion and ambiguity prevails as to ‘what is agroforestry?’ Various definitions have been suggested for agroforestry Systems, vol. 1, pp. 7–12, 1982). However, as opined by Nair (1983a), it is generally agreed that agroforestry represents an approach to integrated land use involving deliberate mixture or retention of trees and other woody perennials in the crop/animal

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production fields. The concepts and principles of agroforestry are now fairly well elucidated (for example, Lundgren 1982; Lundgren and Raintree, 1983; Torres, 1983a; and so on). Similarly, the potential role of agroforestry in diverse situations has also been highlighted by various authors; for example, in the fragile or marginal environments (King, 1979; Chandler and Spurgeon, 1980); in soil conservation (Lundgren and Nair, 1983); in high-potential lands (Budowski, 1983); in areas with insufficient rural infrastructure (Lundgren and Raintree, 1983); in combating deforestation and forest destruction (King, 1980) and so on.

Agroforestry systems and woody perennials

State-of-the-art

If we look at the existing land use systems keeping the broad concept of agroforestry as outlined earlier in mind, we find that several types of agroforestry systems abound around the world (Nair, 1979; 1980; 1983b). The International Council for Research in Agroforestry (ICRAF) is currently undertaking a global inventory of such existing agroforestry systems and practices. As a basic document for the project, a preliminary overview of the agroforestry situation in the developing countries was prepared, indicating the most prominent examples found in the different regions. An abstract of that document, including the summary Table of agroforestry systems can be found in the project announcement that appeared in 1983 in several international journals, including Agroforestry Systems (1(3), pp. 269–273). Though based on the existing knowledge prior to the commencement of the formal survey phase of the project, the Table shows the diversity of agroforestry systems and practices. Without going into the details, suffice it to say that there are several ways in which farmers deliberately incorporate different types of woody perennials in their crop/animal production fields; see, for example, Okigbo (1977); Huxley (1983); Neunhaeuser (1983); Torres (1983a).

A closer examination of the woody perennials so used reveals that most of them are legumes. Based on the literature survey conducted by ICRAF for the earlier-mentioned global inventory of agroforestry systems, some of the most prominent examples of leguminous (and other nitrogen fixing woody perennials) that are currently used in agroforestry systems in the tropics and subtropics are given in Table 1.

Role of woody perennials in agroforestry

In general, the role of woody perennials — including the leguminous ones — in agroforestry can be termed as productive and/or protective depending upon the dominant function(s) of such species.