



Fig. 9. Accumulative infiltration for some Nigerian soils.

gime. While hydromorphic soils mean the same to all soil scientists in terms of morphological and chemical properties, the different soil classification systems are still not very interchangeable because their respective concepts are based on different premises.

According to U.S. Soil Taxonomy, hydromorphic soils have an aquic soil moisture regime, and they appear under the suborder as well as the subgroup levels of classification. The FAO/UNESCO soil classification emphasizes the concept of gleization, and Gleysols and the "gleyic" subunits constitute the major hydromorphic soils of the "FAO Soil Map of the World." For both the French and Belgian classification systems, the processes of gley and pseudogley play prominent parts in the definition of hydromorphism. Moreover, Vertisols in West Africa are also subjected to seasonal waterlogging (pseudogley) and should come under the realm of hydromorphic soils. From the agronomic viewpoint, wherever excess soil moisture is the most important feature in land use for crop production, soils in such areas will come under the realm of hydromorphic soils.

An approximate correlation of the hydromorphic soils among the 3 international soil classification systems has been prepared at IITA.

A preliminary inventory of some chemical and physical properties of hydromorphic soils from Nigeria, Sierra Leone and Liberia may be summarized as follows:

**Forest zone (Liberia, Sierra Leone and southern Nigeria).** Hydromorphic soils occur in coastal, fresh-water swamps, inland swamps and small river valleys. Some areas are subject to deep flooding during the rainy season.

Approximately 80 percent of the hydromorphic soils (excluding acid sulfate soils in this region) are acidic (pH below 5.0) and coarse-textured (loamy sand and sandy loam) with low P and K reserves and low clay activity (Tables 2 and 3). Such soils would require high fertilizer

inputs and good water control for intensive wetland rice production. More fertile rice soils in terms of soil-texture and nutrient status comprise about 15-20 percent of the 37 soils studied (Tables 2 and 3). Wetland areas with such soils may be developed into productive rice land. More detailed and systematic soil surveys by national organizations are needed in order to determine the extent and distribution of the more fertile wetlands and their feasibility for rice production.

Table 2. Texture, organic C and pH of 37 hydromorphic soils from the forest region of West Africa (southern Nigeria, Sierra Leone and Liberia).

Properties and range	Distribution, %	
	Surface soil	Subsurface soil
<b>pH (H<sub>2</sub>O, 1:1)</b>		
4.0-5.0	78	73
5.1-5.5	14	22
5.6-6.0	8	5
<b>Organic C, %</b>		
0.5-1.5	38	97
1.6-2.5	24	3
2.6-5.0	30	0
> 5.0	8	0
<b>Clay content, %</b>		
0-15	46	19
16-25	19	35
25-35	14	16
35-45	8	16
45-55	5	3
55-65	8	11
<b>Silt content, %</b>		
0-10	16	24
11-20	22	24
21-30	16	14
31-40	24	19
41-50	12	14
51-80	10	5

Source of Data: IITA Soil Information Bank, Njala University College and University of Illinois Soil Survey Report for Sierra Leone (1974), Ministry of Agriculture and USAID Soil Survey Report for Liberia (1977), Manor River Union Soil Survey Report, Liberia (1979).

**Forest/savanna transition zone (southern Nigeria).** Hydromorphic soils in the forest/savanna transition zone occur mainly in inland valleys and depressions. As the region is characterized by a rolling topography and quartzose-rich basement complex rocks, the wetland valleys or depressions are generally small, and the soil depths are shallow. All the same, they occupy about 10-15 percent of the total land surface. Most of the hydromorphic land in this region presently is not used for food crop cultivation.

An extensive study on the soil and land characteristics of several inland valleys in the region was completed in 1979. In this study, groundwater regime throughout the year was used as an important criterion for the hydromorphic land quality evaluation. N deficiency and Fe toxicity associated with groundwater or seepage water were