A N N E X E

SOIL

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURE

E 1 INTRODUCTION

This ANNEX presents the study on the distribution of soils and on the assessment of their land capability classes in the three riber basins. In the pedological study, the emphasis of the Team was laid on the assessment of land resource development potentiality and the establishment of recommended pattern for the future land use referring to the both outcomes of the detailed and the reconnaissance soil surveys carried out by the Office of Rural Development (ORD). The results of study will be utilized in the agronomic study, especially in formulating the land use programme in 2001 as the target year of the preliminary feasibility study. This land use programme will be presented in ANNEX F.

All the data and information used for this study were collected from the Institute of Agricultural Science of ORD in Suweon. The data collected are listed up in REFERENCES at the end of this text.

E 2 HISTORICAL AND PRESENT STATUS OF SOIL SURVEY IN KOREA

E 2.1 Soil Survey

The first soil survey in Korea was commenced from 1936 in conformity with the method recommended by the Japanese Society of Agriculture. The soil survey, however, was limited to the cultivated land and was discontinued in 1945 (Ref. E 1).

After independence in 1945, the Soil Research Institute under the Office of Central Agricultural Research was established by the Government. During the period from 1945 to 1958 including two-years interruption of works, the institute edited soil maps from the existing data of several Guns for publication. These soil maps with the scale of 1/50,000 covered only cropland and were prepared by adopting the Japanese soil classification system.

From 1958, a soil advisor was assigned by the United States Government to train Korea staffs in soil survey methods of the United States Department of Agriculture (U.S.D.A.). The soil classification system used in this training was based on the 1938-Yearbook system of U.S.D.A. The training ended in 1960 and a few small areas were mapped during this time.

In 1960, the Government of Republic of Korea decided to initiate a soil survey work again aiming at provision of basic information for land resource development planning. The Government gave instructions for the execution of the soil survey work to the Office of Central Agricultural Research. The soil survey work was primarily undertaken in Daejeon and some other areas on the basis of methods developed by U.S.D.A. In 1964, ORD, into which agricultural research and extension organizations of Korea were wholly unified in 1962, strengthened its soil survey activities in order to carry out the Korean Soil Survey Project with the assistance of the UNDP/FAO (KOR 13). The project which was performed throughout the whole country became operational in October, 1964, and ended in December, 1969. The reconnaissance soil map as the final outcome was published in 1971.

Other than the Korean Soil Survey Project, soil surveys of various grade were conducted during the period from 1965 to 1970; the United Nations Korean Upland Project, the United Nations Korean Tideland Project, the Han River Basin Project (USAID) and the soil survey of mountainous forest lands by the Forest Experiment Station.

The detailed soil survey was undertaken as a component of the Korean Soil Survey Project in three limited areas of Gyeongsang-bug and Gyeongsang-nam Dos from 1964 to 1969. After the completion of the Project, ORD has concentrated its efforts in executing the detailed soil survey on lands having the priority of agricultural development. In 1975, ORD formulated a definite plan to complete the survey in the target area of 2,651,000 ha till 1979. By the end of 1978, 83 % of the target area was investigated and 67 % was mapped as shown in Fig. E 1.

E 2.2 Existing Soil Map

Three kinds of soil maps authorized are available in Korea. They comprehend two kinds of the reconnaissance soil map having the scale of 1/250,000 and 1/50,000, respectively, and the detailed soil map in the scale of 1/25,000 (Refs. E 2 to E 4).

The reconnaissance soil map of 1/250,000 has 19 mapping units and two mapping symbols. These units are described in terms of an association of two or more "soil series" as one of the soil classification categories. In the reconnaissance soil map of 1/50,000, there are 52 mapping subunits which are further divided from the above 19 units and also depicted in terms of the soil association.

In the detailed soil map of 1/25,000, "soil phase", which is the lowest soil classification category, is employed as a mapping unit. Although the detailed soil survey is under way, 368 soil series comprising 1,144 soil phases have been recognized till December, 1978. To utilize the results of the detailed soil survey for agricultural purposes, each mapping unit recognized was evaluated from the viewpoint of land capability for five land-use patterns which were paddy field, upland, orchard, grass land and forest land. The result of evaluation was complied in the soil survey material series No. 7, "Land Use

Classification by Soil Phase, 1964-1976", prepared by ORD. Thus, whenever referred to this document, any user can obtain the definite information on soil characteristics, unit by unit, related to agricultural use as well as that on both the present and recommended land-use patterns (Ref. E 5).

E 3 GENETIC FACTORS OF SOILS

Soils bear characteristics proper to the total combined effects of parent rock, climate, relief of the land, vegetation and time (Refs. E 1, E 6 and E 7).

E 3.1 Parent Rock

The rocks underlying in the three river basins primarily consist of granite, gneiss, schist, andesite, porphyry, shale and limestones, and they range in geological age from pre-Cambrian to the most recent geological times.

In the Han river basin, the parent materials of soils in the mountainous and hilly areas are derived from weathering of the underlying rock like granite-gneiss or crystalline schist in the north Han area and of the metamorphic limestones or sedimentary rocks in the south Han area. The soils in the valleys of the Han and its major tributaries are originated from materials, mainly consisting of granitic alluvium washed from higher areas. The soils of the flat plains in the basin are the deposits derived from granite-gneiss rocks.

In the Nagdong river basin, the parent materials of soils in the northern and western parts are represented by residuals and deposits of weathered granite or granite-gneiss rocks. The soils in the eastern part consist of weathered materials derived from shale, sandstone, porphyry and/or andesite. The soils of the inland and flood plains along the Nagdong river and its main tributary, the Nam river, are fluvial mixtures of sand, silt and clay, with gravel, cobbles and stones. These mixtures comprise mudstones, shales and sandstones. The southern coastal areas have a geomorphological feature of fluvio-marine plains so that the soils, especially extended over the Gimhae plain, are formed by silty and clayey sediments deposited in sea or brackish water or inundated with sea water.

In the Seomjin river basin, granite, granite-gneiss or schistone granite rock is representative parent materials of soils. In the hilly

and mountainous areas, the soils are of fresh weathered materials characterized by the feature of parent rocks to a large extent. The soils of the inland plains along the Seomjin river and its main tributaries comprise fluvium derived from mixtures of weathered parent materials.

E 3.2 Climate

Soils of Korea are kept moist or wet from June to August, the season of greatest rainfall, and kept nearly dry for the rest of the year. Therefore, chemical and biological activities, which are the major genetic factors of soils, are intense during the wet and hot summer, but not so much in the dry autumn and the cold winter. It can be said that these activities occurred are much the same in the three river basins. Thus, climatic differences in the three river basins have distinctly not been enough to cause major differences in soils originated from same parent materials.

E 3.3 Relief of the Land

Land forms in the three river basins can be divided into the following seven groups: high mountains and plateau remnants, hilly and mountainous lands, rolling lands, inland alluvial plains and valleys, flood plains, coastal plains, and coastal beaches and dunes.

The slope of high mountains and plateau remnants is generally steep. On the steep slopes of the mountains, soils have rapidly been removed by erosion. As a result, shallow soils with weakly developed horizons and many outcrops of bedrocks are common and those characteristics reflect to a large extent the feature of parent materials.

Soils of the hilly and mountainous lands as well as rolling lands are similar to those of the high mountains, but there extend residual soils which have remained on steep and moderately steep slopes long enough to form distinct horizons of clay accumulation to greater extent.

There exist many alluvial-colluvial deposits in depressions at heads of streams, along the streams and on foot slopes throughout the

mountainous, hilly and rolling areas. In these positions, which are mainly defined as inland alluvial plains and valleys along the middle reach of the three rivers and those major tributaries, small differences in relief cause major differences in soil characteristics because of the effect on drainage. Although the drainage condition varies broadly from moderately well drained to poorly drained, soils formed in these positions are important from the viewpoint of agricultural use.

Flood plains along the downstream of the three rivers and coastal plains are formed with alluvial deposits. Owing to their flat topography, most of the plains have been used for rice cultivation and the alluvial deposits have been metamorphosed into paddy soils under artificially inundated condition.

E 3.4 Vegetation and Time

The original vegetation over most of the three river basins was forest which comprised pines and firs, together with chestnuts, oaks, birches and other broad-leaved trees, but afterward large areas became under sparse secondary or degraded vegetation by human use, especially almost denuded in the outskirts of densely populated towns and cities. Recently, these sparsely vegetated areas have been afforested for erosion control of the steep slopes. If the natural vegetation were not intervened by man as mentioned above, the vegetation would have more significantly affected soil genesis in large areas.

On the other hand, soils of paddy fields in the three river basins have been formed by such kinds of human activities as land preparation, irrigation and control of both water tables of surface water and groundwater by drainage. As many paddy fields, at low elevations in the Seomjin river basin as well as the middle and downstream parts of the Nagdong river basin are used for two crops a year, rice in the summer and barley or wheat in the winter, under warm climate, paddy soils accumulate less organic matter in surface horizons compared with the paddy soils of the Han river basin and the upper part of Nagdong river basin where single cropping have been predominant under cool climate.

The ages of soils in the three river basins vary a great deal. Soils in areas reclaimed from tidelands, or in recent alluvial deposits, may be only a few years old, while some soils on stable upland positions have developed distinct horizons and may be considered to be mature in soil genesis with ages measured in many thousands of years. In most of the three river basins, however, the soils are of recent to intermediate age, having formed in alluvial areas or on slopes that are undergoing erosion.

Seasonal fluctuation of groundwater table depending on artificially inundated condition for rice clutivation has changed the soil profile of paddy field. The typical changes are pan formation, gleying profile formation and mottling. Noticiable changes can be observed in a period as short as five years from the beginning of rice cultivation.

E 4 SOIL CLASSIFICATION

The 1938-Yearbook system of U.S.D.A. was employed for the soil classification during the first three years of the Korean Soil Survey Project. This classification was based upon such category as "genetic great soil groups" of this system with some supplements. In 1960, the revised soil classification scheme of U.S.D.A. was proposed in preliminary form, and further modifications were summarized in a supplement issued in 1967 (Refs. E 8 & E 9). When the revised classification system became available, its principles were adopted as a basis for establishing new soil series in the Korean Soil Survey Project (Ref. E 1).

The followings show the genetic great soil groups of 1938-Yearbook system which have been recognized in Korea through the Korean Soil Survey Project.

(1) Red-Yellow Podzolic Soils
(2) Reddish-Brown Lateritic Soils
(3) Gray-Brown Podzolic Soils
(4) Acid Brown Forest Soils
(5) Low Humic Gley Soils
(6) Planosols
(7) Bog Soils
(8) Ando Soils
(9) Lithosols
(10) Regosols
(11) Alluvial Soils

Table E 1 presents the general relations among the Genetic Great Soil Groups of the 1938-Yearbook of U.S.D.A. and the Great Groups of the revised 1967 U.S.D.A. classification, and the Soil Units of the 1970 FAO Soil Map of the World.

As mentioned in E 2.2, 368 soil series in total have been established till December, 1978, among which 270 soil series were already classified by the 1967 U.S.A.D. system and their characteristics were presented in the "Official Soil Series Description (Vols. 1 to 4)" published by ORD in conformity with FAO's guideline for soil profile description (Ref. E 10). Table E 2 shows the classification of soil series recognized in the three river basins by employing the 1967 U.S.D.A. system.

E 5 AREA EXTENT OF SOILS

As described in E 2.2, the reconnaissance soil map in the scale of 1/50,000 covers the whole country and its mapping unit and submit are described in terms of the soil association. All the soil associations recognized within the three river basins are listed up in Table E 3. In addition, the names of representative soil series which are main components of each soil association are also given in Table E 3.

Area extent of each soil association employed for the mapping unit and subunit of the reconnaissance soil map was estimated for every 50 sub-basins which were corresponding to those of irrigation water use study in the three river basins in ANNEX G. The results of estimation is presented in Tables E 4 to E 6 and their summary is as follows;

(1) Soils of fluvio-marine plains including coastal beaches and dunes are distributed among 1.3 % of the Han river basin, 0.6 % of the Nagdong river basin and 1.1 % of the Seomjin river basin:

(2) Soils of flood plains, alluvial plains and narrow valleys extend over 13.2 % of the Han river basin, 20.0 % of the Nagdong river basin and 18.7 % of the Seomjin river basin:

(3) Soils of dilluvial terrace stretch 16.1 % of the Han river basin, 10.1 % of the Nagdong river basin and 9.7 % of the Seomjin river basin:

(4) Soils of strongly dissected hilly and mountainous lands extend over 58.3 % of the Han river basin, 60.1 % of the Nagdong river basin and 63.5 % of the Seomjin river basin:

(5) Soils of miscellaneous lands are distributed among 11.1 % of the Han river basin, 9.2 % of the Nagdong river basin and 7.0 % of the Seomjin river basin.

E 6 DESCRIPTION OF REPRESENTATIVE SOIL SERIES EXTENDED OVER FARM LAND

The representative soil series extended over paddy field or upland in the three river basins were chosen, and their soil characteristics are generally described as follows in accordance with the "Official Soil Series Description" prepared by ORD. The detailed soil profile descriptions are attached as Tables E 7 and E 8 (Refs. E 5 & E 10).

E 6.1 Paddy Field

(1) Gimje series

The Gimje series is a member of the fine clayey, mixed, nonacid and mesic family of Fluventic Haplaquepts (Low Humic Gley soils). This soil has moderately thick, grayish brown and silty clay loam Apg horizon, and moderately deep, gray to dark grayish brown, slightly acid to mildly alkline, silty clay and cambic Bg horizon. Neutral Cg horizon is greenish gray and silt loam to silty clay loam. A peaty layer less than 20 cm in thickness occurs between 50 and 70 cm below the ground surface. The Gimje series is derived from alluvial materials on fluvio-marine plains. Area extent delineated by the end of 1976 totals 5,327 ha over the country.

(2) Jeonbug series

The Jeonbug series is a member of the fine silty, mixed, non-acid and mesic family of Aeric-Fluventic Haplaquepts (Low Humic Gley soils). This soil has moderately thick, gray or dark grayish brown and silt loam Apg horizon, and deep, yellowish brown, silty clay loam and cambic B horizon with common or many gray mottles. Cg horizon is very deep, dark gray or dark greenish gray and silt loam having few or no mottles. This soil has developed in broad fluvio-marine plains. Area extent totals 33,460 ha throughout the country.

(3) Mangyeong series

The Mangeyeong series is a member of the coarse silty, mixed, nonacid and mesic family of Fluventic Haplaquepts (Low Humic Gley

soils). This soil has moderately thick, gray to dark grayish brown and silt loam Apg horizon, and moderately deep, yellowish brown mottled, gray, silt loam and cambic B horizon. Cg horizon is dark gray or greenish gray and silt loam having few or no mottles. This soil is on broad level fluvio-marine plains and is derived from very coarse silty materials. Area extent is 31,862 ha in total all over the country.

(4) Pyeongtaeg series

The Pyeongtaeg series is a member of the fine silty, mixed nonacid and mesic family of Typic Haplaquepts (Low Humic Gley soils). This soil has thin, grayish brown or dark grayish brown and silt loam or silty clay loam Ap horizon with brown to dark brown mottles. Cg horizon is grayish brown or dark grayish brown or dark grayish brown and silt loam or silty clay loam. This soil is formed from alluvium on broad flood alluvial plains which contact fluvio-marine deposits. Area extent totals 14,819 ha throughout the country.

(5) Sinheung series

The Sinheung series is a member of the fine loamy, mixed non-acid and mesic family of Aeric Fluventic Haplaquepts (Low Humic Gley intergrading to Alluvial soils). This soil has moderately thick, loam, and cambic Bg horizon with grayish brown, dark grayish brown or gray mottles. Cg horizon is dark grayish brown on grayish brown, loam, and silt loam or fine sandy loam and has yellowish brown mottles. This series is originated from recent alluvium on broad flood plains. Area extent totals 11,840 ha all over the country.

(6) Hamchang series

The Hamchang series is a member of the coarse loamy, mixed and mesic family of Typic Haplaquepts (Low Humic Gley soils). This soil has moderately thick, dark grayish brown and silt loam Apg horizon, and cambic Bg horizon with dark yellowish brown mottles. Cg horizon is gray and fine sandy loam and has few light olive

brown mottles. This soil has developed in inland alluvial plains where alluviums are weakly stratified. Area extent of this soil series totals 11,493 ha throughout the country.

(7) Sindab series

The Sindab series is a member of the sandy, mixed and mesic family of Typic Psammaquents (Alluvial soils). This soil has thin, gray to olive brown and fine gravelly loamy coarse sand Ap horizon, and deep and fine gravelly coarse sand Cg horizon. This soil occurs on level to very gently sloping alluvial plains and is formed from alluvial materials mostly in granitic areas. Area extent totals 9,568 ha in the whole country.

(8) Honam series

The Honam series is a member of the fine clayey, mixed and mesic family of Typic Ochraqualfs (Low Humic Gley soils). This soil has dark grayish brown and silty clay loam Apg horizon, and deep, dark gray and silty clay Btg horizon with common, and yellowish red and yellowish brown mottles. Cg horizon is gray to dark gray and silty clay. This series is on low terraces in broad alluvial plains and is of alluvium. Area extent totals 6,461 ha in the country.

(9) Hwadong series

The Hwadong series is a member of the fine clayey, mixed and mesic family of Aquic Hapludalfs (Red-Yellow Podzolic soils with high base saturation). This soil has thin, grayish brown and silty clay loam Apg horizon, and deep, yellowish red and silty clay Bt horizon with gray mottles increasing with depth. C horizon is gray, mottled in brown and silty clay. This soil has developed on slightly and moderately elevated river terrace derived mainly from granitic rocks and shale. Area extent is 10,394 ha in total throughout the country.

(10) Sacheon series

The Sacheon series is a member of the coarse loamy, mixed,

nonacid and mesic family of Aeric-Fluventic Haplaquepts (Alluvial soils). This soil has moderately thick, very dark grayish brown and sandy loam Apg horizon in paddy field, and moderately deep, yellowish brown, sandy loam and cambic B horizon with common and dark grayish brown mottles. Cg horizon is dark grayish brown and loam or sandy loam having common to many and yellowish brown or strong brown mottles. This soil has developed in gently sloping narrow local valleys, on local alluvial plains, fans and mountainous foot slopes mostly in granitic areas. Area extent totals 37,671 ha in the whole country.

(11) Jisan series

The Jisan series is a member of the fine loamy, mixed and mesic family of Fluventic Haplaquepts (Low Humic Gley soils). This soil has moderately thick, dark greyish brown and loam Apg horizon, and very thick, grayish brown, light clay loam and cambic Bg horizon with yellowish brown and yellowish red mottles. Cg horizon is dark gray and loam having a few mottles and some gravels in places. This soil has developed from weakly stratified local alluvial materials in gently sloping narrow valley and been derived from granite, andesite porphyry and similar soil materials on alluvial fans. Area extent totals 64,312 ha over the country.

(12) Ogcheon series

The Ogcheon series is a member of the fine loamy, mixed, acid and mesic family of Fluventic Haplaquepts (Low Humic Gley soils). This soil has grayish brown or dark grayish brown and loam or slit loam Apg horizon, and moderately deep, dark gray, silt loam or loam and cambic Bg horizon with few ferrous carbonate mottles. Cg horizon is very thick, dark gray and silt loam or loam having ferrous carbonate mottles. This soil has developed in nearly level to gently sloping valleys with local alluvium. Area Extent is 13,709 ha in total in the whole country.

E 6.2 Upland

(1) Bonryang series

The Bonryang series is a member of the coarse loamy, mixed and mesic family of Typic Udifluvents (Alluvial soils). This soil has thin, brown and sandy loam Ap horizon, and moderately thick, brown to dark brown and sandy loam upper substrate followed by very deep, stratified, brown and gravelly loamy sand or gravelly sand lower substrate. This is originated from stratified alluvium on broad flood plains. Area extent is 4,480 ha in total throughout the country.

(2) Nagdong series

The Nagdong series is a member of the sandy, mixed and mesic family of Typic Udipsamments (Alluvial soils). This soil has thin, yellowish brown to brown, loamy fine sand to fine sandy loam A horizon, and yellowish brown and loamy fine sand C horizon more than 150 cm deep. This soil occurs on inland river levees. Area extent totals 10,505 ha throughout the country.

(3) Ihyeon series

The Ihyeon series is a member of the coarse silty, mixed and mesic family of Dystric-Fluventic Eutrochrepts (Alluvial soils). This soil has moderately thick, brown to dark brown and silt loam A horizon and deep, dark yellowish brown to brown, silt loam and cambic B horizon. C horizon is very deep, brown, weakly stratified and silt loam. This soil extends over slightly elevated portions of flood plains. Area extent totals 8,575 ha throughout the whole country.

(4) Bancheon series

The Bancheon series is a member of the fine clayey, nonacid and mesic family of Typic Hapludalfs (Red-Yellow Podzolic soils with high base saturation). This soils has brown to dark brown and silty clay loam Ap or A1 horizon, and yellowish red and silty clay B horizon. C horizon is strongly weathered, stratified

variably, gravelly and clayey, and old alluvium. This soil has developed on dissected terraces relatively higher than stream. Area extent totals 6,580 ha throughout the country.

(5) Hwangyeong series

The Hwangyeong series is a member of the sandy skeletal, mixed and mesic family of Typic Udipsamments (Alluvial soils). This soil has thin, brown and gravelly loamy sand A horizon, and very deep, pale brown, very gravelly to very cobbly loamy sand or sand C horizon. This soil is formed from weakly stratified and very gravelly and very cobbly mixed alluvium on very gently sloping alluvial plains in mountain valleys. Area extent is 17,408 ha in total in the whole country.

(6) Pungcheon series

The Pungcheon series is a member of the loamy skeletal, mixed and mesic family of Dystric-Fluventic Eutrochrepts (Alluvial soils). This soil has thick, brown to dark brown and gravelly loam A horizon, and thin, dark yellowish brown, very gravelly loam and cambic B horizon. C horizon is dark yellowish brown and very gravelly loam or sandy loam. This soil has developed on alluvial fans, in local valleys and on mountain foot slopes with alluvial-colluvial materials. Area extent is 12,238 ha in total throughout the country.

(7) Daegog series

The Daegog series is a member of the fine loamy, mixed and mesic family of Fluvaquentic Dystrochrepts (Regosols). This soil has moderately thick, brown to dark brown and loam A horizon, and deep, brown to dark brown, loam and cambic B horizon with grayish brown mottles in the lower part of the horizon. C horizon is dark yellowish brown, grayish brown mottled, weakly stratified and silt loam, loam or sandy loam. This soil has developed in narrow valley and mountain foot slope position and derived from local alluvial-colluvial and alluvial fan deposits of which origin were acidic crystalline materials. Area extent is 4,796 ha in total over the whole country.

(8) Sangju series

The Sangju series is a member of the coarse loamy, mixed and mesic family of Dystric-Fluventic Eutrochrepts (Alluvial soils). This soils has moderately thick, brown and fine gravelly sandy loam Ap horizon and deep, dark yellowish brown fine gravelly sandy loam, coarse sandy loam or loam and cambic B horizon. This soil has developed in mountain foot slope positions along local valley and its parent materials are derived from coarse textured and light colored granite. Area extent totals 45,742 ha throughout the whole country.

(9) Seogto series

The Seogto series is a member of the loamy skeletal, mixed and mesic family of Dystric Fluventic Eutrochrepts (Regosols). This soil has moderately thick, brown to dark brown and gravelly to stony silt loam A horizon, and moderately deep, yellowish brown, very gravelly, cobbly or stony silty clay loam and cambic B horizon. C horizon is deep, yellowish brown, very gravelly and cobbly or stony silt loam. This soil is of mountain colluvium originated from acidic crystalline materials such as andesite, porphyry and granite. Area extent totals 63,759 ha over the country.

(10) Samgag series

The Samgag series is a member of the coarse loamy and mesic family of Typic Dystrochrepts (Lithosols). This soil has thin, brown and sandy loam A horizon and moderately thick, strong brown to yellowish brown, sandy loam and cambic B horizon. C horison is very thick, strongly weathered, brownish yellow and sandy loam to loamy sand saprolite. This soil has developed in hilly and mountainous areas in the form of residuum derived from granitic materials. Area extent totals 252,116 ha in the whole country.

E 7 SUITABILITY OF PADDY SOILS FOR CULTIVATION OF HIGH-YIELDING NEW RICE VARIETIES AND THEIR PRODUCTIVITY

E 7.1 Type of Paddy Field

According to the "Achievements and Objectives of Principal Research Works in Institute of Agricultural Science" edited by ORD in 1978 (Ref. E 11), paddy fields of Korea are separated into the following six types;

(1) Ordinary paddy field,
(2) Poorly drained paddy field,
(3) Sandy paddy field,
(4) Unripe paddy field,
(5) Saline paddy field, and
(6) Acid sulphate paddy field.

A representative kind of soil extending over each type of paddy field can be interpreted by referring to the mapping subunit of the reconnaissance soil map and to the instructions given in the "Subject of Extension for Improved Farming Technology" edited by ORD in 1978 (Ref. E 12). The correlation between the type of paddy field and the soil association defined by the mapping subunit is described in Table E 9. Among six types, the unripe paddy field is featured by coarse textured and nonstratified soils which are derived from siliceous crystalline materials and extent in valleys between rolling lands as well as hilly and mountainous areas. The results of interpretation made for every 50 sub-basins, which correspond to those used for the agricultural water requirement study in ANNEX G, is tabulated in Tables E 10 to E 12 and summarized below;

(1) In the Han river basin, the ordinary paddy field occupies 36.3 % of the total followed by the sandy type of which proportional extent is 32.7 %. Next, 30.4 % of total paddy field consists of the unripe type. The remaining 0.6 % comprises the poorly drained, saline and acid sulphate paddy fields,

(2) In the Nagdong river basin, the maximum type is the sandy one occupying 46.5 % of the whole basin, 37.3 % of the northern zone, 47.9 % of the central zone and 51.5 % of the southern zone. The next is the ordinary type covering 28.1 % of the whole basin,

28.3 % of the central zone and 30.1 % of the southern zone, while, in the northern zone, 37.2 % is occupied by the unripe type. The third position is held by the unripe type of which proportional extent is 24.5 % for the whole basin, 23.3 % for the central zone and 16.5 % for the southern zone, but, in the northern zone, the ordinary type is third one and covers 25.1 %. The remaining portion mainly consists of the poorly drained type occupying 0.4 % of the whole basin, 0.4 % of the northern zone, 0.5 % of the central zone and 0.4 % of the southern zone. In addition, the saline and acid sulphate type extends over 0.5 % of the whole basin and 1.5 % of the southern zone.

(3) In Seomjin river basin, the sandy paddy field is dominant and its extent reaches 44.5 %. The unripe type covers 27.8 % of the total paddy field and is followed by the ordinary type extending over 23.6 %. The remaining 3.5 % is the poorly drained type.

E 7.2 Suitability for Cultivation of High-Yielding New Rice Varieties

In the "Subject of Extension for Improved Farming Technology" edited by ORD (Ref. E 12), each type of paddy field is graded by the suitability for cultivation of high-yielding new rice varieties taking into account the chemical characteristics and physical properties of paddy soils.

(1) Most suitable:
- Ordinary paddy field in fluvio-marine and alluvial plains,
- Two thirds of ordinary paddy field in narrow valleys,

(2) Suitable:
- One third of ordinary paddy field in narrow valleys,
- Sandy paddy field in fluvio-marine, flood and alluvial plains, and in narrow valleys,
- Half of unripe paddy field in narrow valley,

(3) Less suitable:
- Poorly drained paddy field in fluvio-marine and alluvial plains,

- Half of unripe paddy field in narrow valleys, and
- Saline and acid sulphate paddy field in fluvio-marine plains.

In this grading, the following factors of soils are considered largely as a key affecting the suitability for cultivation of high-yielding new rice varieties: Clay content, organic matter content, cation exchange capacity, and porosity as well as peculiar acidity and salinity. These factors, individually or compositely, are the exclusive feature with the paddy soils of Korea. Firstly, soils of poorly drained paddy field in fluvio-marine and alluvial plains are characterized by single-grained structure and slow permeability, due to low content of organic matter and small porosity, which mainly cause frequent occurrence or root-rot disease in the late growing period of rice. Secondly, soils of unripe paddy field in narrow valleys and sandy paddy field in fluvio-marine, flood and alluvial plains are small in cation exchange capacity, due to low content of clay and organic matter, which increases in top dressing requirement at panicle formation stage of rice. In Korea, since the time of top dressing usually overlaps the heavy rainy season, July and August, plant physiological condition of rice grows worse by nitrogen fertilizer applied for the top dressing and, as a result, rice is hazarded by brown spot and blast diseases. Especially, the rice is seriously exposed to these diseased when it is planted on unripe paddy field extended over the upper reach of the narrow valleys, because the soils consist of undifferentiated recent deposits and are less mature than those extended over the lower reach of the narrow valleys. Thirdly, soils of saline and acid sulphate paddy field in fluvio-marine plains are featured by high content of chloride or sulphate, due to soil genesis, which causes reduced root activity of rice. The reduction of root activity severely restricts selective absorption of fertilizer nutrient through roots and, therefore, autumn decline ("akiochi") frequently occurs in the late growing period of rice.

E 7.3 Productivity of Paddy Soils

The following rice yield index for each type of paddy field was

compiled by ORD based upon the regional cooperative yield trials of high-yielding new variety under standard fertilizer condition carried out in 1976 and 1977 (Ref. E 11);

(1) Ordinary paddy field : yield index 95-100,
(2) Sandy paddy field : yield index 95,
(3) Unripe paddy field : yield index 84 (lower reach of valley), 70-75 (upper reach of valley),
(4) Saline paddy field : yield index 63,
(5) Acid sulphate paddy field : yield index 63, and
(6) Poorly drained paddy field : (yield index expressed as below).

According to the ORD's trial and other experimental data, the yield index for the poorly drained paddy field ranges between 75 and 80 (Refs. E 11 & E 15 to E 17). When the physical characteristics of soils are improved after the paddy field has become dry throughout land consolidation works, the yield index goes up to 99 at maximum.

E 7.4 Suitability/Productivity Grade

Seven suitability/productivity grades of paddy soils can be established by combining the ORD's classification regarding the type of paddy field and the suitability for cultivation of high-yielding new rice varieties (Ref. E 12). Table E 13 presents the suitability/productivity grade of paddy soils for cultivation of high-yielding new rice varieties and its correlation with the soil association.

Tables E 14 to E 16 present proportional extent of the suitability/productivity grade in every 50 sub-basins which corresponds to those used for the agricultural water requirement study in ANNEX G. The summary is as follows; soils of grades 1 through 3 extend over 68.9 % of the total paddy field in the Han river basin, 74.6 % in the Nagdong river basin and 68.3 % in the Seomjin river basin: soils of grade 4 cover 15.2 % of the total paddy field in the Han river basin, 12.2 % in the Nagdong river basin and 14.0 % in the Seomjin river basin. The remaining proportion, i.e. 15.9 % for the Han river basin, 13.2 % for the Nagdong river basin and 17.7 % for the Seomjin river basin, belongs to grades 5 to 7.

E 8 LAND CAPABILITY CLASSIFICATION

The first land capability classification system of Korea was made through the Korea Soil Survey Project taking into account U.S.D.A. system (Ref. E 1). In this system, there are eight general classes numbered I through VIII, representing the degree of limitations, and four subclasses representing the general nature of the problem. All the soil series recognized by the above-mentioned project were evaluated for land capability classification for agricultural use by applying this system.

As described in E 2.2, all the soil series have been more detailedly classified in the soil phase in progress of the detailed soil survey works. ORD has recently prepared the new criteria for land capability classification referring to U.S.B.R. system in order to utilize the outcome of detailed soil survey works more practically and broadly (Refs. E 5, E 6 and E 14).

The new land capability classification system has five different criteria as tabulated in Tables E 17 to E 21, each applicable for paddy field, upland, orchard and mulberry field, grass land, and forest land. All the soil phases are evaluated based upon the said criteria and then their capability each for the above five land use pattern is graded into five classes, i.e. Class 1 through Class 5. Among these five classes, Class 1 soils will produce high yields of a wide variety of crops without special management, while Class 5 soils could not produce enough yields of any crops in comparison with agricultural investment. Soils of Classes 2 to 4 have common on very low productivity corresponding to limitations to soil management and crop cultivation.

The capability subclass is suffixed by a subclass symbol, which gives information on present status of hazards and limitations to agricultural land use of the soils. The subclass symbols are (g) for stoniness, (c) for clay, (p) for slope, (w) for wetness, (m) for immaturity, (s) for sandy, (a) for acidity, (n) for salinity, (d) for hard pan, (r) for bedrock, and (e) for erosion.

In order to recommend a future land use pattern, land capability of each soil phase is evaluated on the basis of the five different

criteria presented in Tables E 17 to E 21 as mentioned before. According to this evaluation, the future land use pattern is principally determined. But, if each soil phase is classified into the same rank for two or more land use patterns, the recommended land use pattern is decided on the basis of the additional criteria tabulated in Table E 22.

All the outcomes of the abovementioned evaluation and recommendation for the soil phases, which have been identified till the end of 1976, are compiled as the soil survey material series, No. 7, "Land Use Classification by Soil Phase, (1964-1977)" prepared by ORD (Ref. E 5). For example, Table E 23 shows the land capability evaluation and recommended land use pattern of representative soil series extended over farm lands as described in E 6.

E 9 EVALUATION OF POTENTIAL LAND USE IN THREE RIVER BASINS

For the assessment of land resource development potentiality in the three river basins, the aforementioned evaluation and recommendation or ORD are fully referred to in this study. As for the area where the detailed soil survey works are under way or under schedule, the reconnaissance soil map is supplemented in getting necessary information for the land capability evaluation.

Through this methodology, the potential pattern of the future land use in the three river basins was established. Tables E 24 to E 26 show the area extent of recommended land use pattern for every 50 sub-basins which correspond to those made for the agricultural water requirement study.

In comparison with the present pattern of land use in December, 1976 as shown in Tables F 25 to F 27 in Annex F, the proportional extent of paddy field can increase by 8 % and that of upland can raise by 24 % respectively, in the total of the three river basins. The increase in paddy field will be mainly born from conversion of upland with the slope mainly less than 2 %, while that in upland will arise from new land reclamation of sparse forest with the slope ranging between 7 % and 15 %.

REFERENCES

E 1 THE SOILS OF KOREA KOR 13 Technical Report 1, UNDP/FAO, 1970

E 2 RECONNAISSANCE SOIL MAP OF KOREA (scale 1/250,000), ORD, 1971

E 3 RECONNAISSANCE SOIL MAP (scale 1/50,000), ORD, 1971

- Seoul Special City and Gyeonggi Do
- Gangweon Do
- Chungcheong Bug Do
- Jeonla Bug Do
- Jeonla Nam Do
- Gyeongsang Bug Do
- Busan City and Gyeongsang Nam Do

E 4 DETAILED SOIL MAP (scale 1/25,000), ORD, 1971

- Gyeonggi Do

Yangju Gun	Yeoju Gun
Gwangju Gun	Yangpyeong Gun
Icheon Gun	Gimpo Gun

- Gangweon Do

Pyeongchang Gun

- Gyeongsang Bug Do

Dalseong Gun	Gyeongsan Gun
Chilgog Gun	Seonsan Gun
Sangju Gun	Yecheon Gun

- Gyeongsang Nam Do

Jinyang Gun	Euiryeong Gun
Haman Gun	Changnyeong Gun
Milayang Gun	Gimhae Gun
Changweon Gun	Sacheon Gun

E 5 LAND USE CLASSIFICATION BY SOIL PHASE (1964-1976) Soil Survey

E 6 SOIL SURVEY MANUAL Vols. 1 & 2, Soil Survey Material Series Nos. 1 & 2, ORD, 1973

E 7 THE DESCRIPTION AND CLASSIFICATION OF KOREAN SOILS, SOILS OF THE ASPAC REGION, PART 2 KOREA, Technical Bulletin No. 10,

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E 16 A HISTORICAL REVIEW ON THE LOCAL VARIATION OF RICE YIELDS, The Research Reports of the Office of Rural Development, Vol. 18 (Soil Science: Fertilizer: Plant Protection & Micrology), J.H. Ree & Y.H. Shin, ORD, 1976

E 17 HISTORY OF FARM LAND DEVELOPMENT IN KOREA (Draft), MOAF/ADC, 1977

Table E 1 COMPARISON OF SOIL CLASSIFICATION SYSTEM FOR KOREAN SOILS

Great Soil Groups 1938 Yearbook and Supplements U.S.D.A.	Great Group 1967 U.S.D.A. Soil Classification	Soil Units FAO/UNESCO Soil Map of the World (1970)
Alluvial, Low Humic Gley-Alluvial	Haplaquents	Eutric Fluvisol
Alluvial	Psammaquents	Eutric Fluvisol
Alluvial	Udifluvents	Dystric Fluvison
Regosols, Lithosols	Udorthents	Eutric Regosols
Alluvial	Udipsamments	Dystric Regosols
Low Humic Gley, Low Humic Gley-Alluvial, "Acid Sulphate"	Haplaquepts	Eutric Fluvisols, Dystric Fluvisols, Eutric Gleysols, Dystric Gleysols, Thionic Fluvisols
Ando Soils	Dystrandepts	Ochric Andosols, Humic Andosols
Lithosols, Regosols, Acid Brown Forest Alluvial	Dystrochrepts	Dystric Cambisols, Rankers
Alluvial, Alluvial - Red Yellow Podzolic, Alluvial-Low Humic Gley, Regosols	Eutrochrepts	Eutric Cambisols
Acid Brown Forest	Fragiochrepts	Dystric Cambisols
Acid Brown Forest Lithosols	Haplumbrepts	Humic Cambisols Renkers
Alluvial	Hapludolls	Haplic Phaeozems
Low Humic Gley	Ochraqualfs	Gleyic Luvisols
Red-Yellow Podzolic (with high base status), Gray-Brown Podzolic	Hapludalfs	Orthic Luvisols
Red-Yellow Podzolic, Acid Brown Forest	Hapludults	Orthic Acrisols
Reddish-Brown Lateritic	Rhodudults	Acrisols, Nitosols
Bog	Histosols	Histosols

Source; Ref. E 1

Table E 2 CLASSIFICATION OF SOIL SERIES (1967 U.S.D.A. SYSTEM)

Order/ Sub-order	Great Group	Subgroup/ Texture Family	Series
Entisols	Udifluvents	Typic Udifluvents	
Fluvents		Coarse loamy over sandy skeletal	Deogcheon
		Coarse loamy over sandy	Bonryang
		Coarse loamy	Jungdong
		Aquic Udifluvents	
		Sandy skeletal	Namgye
		Sandy	Jangcheon
		Loamy skeletal	Haenggog
		Coarse loamy	Maryeong
Orthents	Udorthents	Typic Udorthents	
		Loamy skeletal	Suam
		Lithic Udorthents	
		Loamy skeletal	Deogsan, Gwanag, Nagseo, Haengsan
		Fine loamy	Jangseong, Jeongja
Psamments	Udipsamments	Typic Udipsamments	
		Sandy skeletal	Hwangryong, Ibseog
		Sandy	Dosan, Nagdong, Togye, Hwabong, Haeri
		Aquic Udipsamments	
		Sandy over loamy	Sadu
		Sandy	Geumcheon, Hasa, Baegsu

Source ; Ref. E 8

Note ; Soil series recognized within the Jeju Do are excluded.

Table E 2 Continued (2)

Order/ Sub-order	Great Group	Subgroup/ Texture Family	Series
Aquents	Fluvaquents	Typic Fluvaquents	
		Loamy skeletal	Gapo
		Coarse loamy	Gupo, Munpo
	Psammaquents	Typic Psammaquents	
		Sandy skeletal	Geumji
		Sandy	Sindab, Yeompo
	Haplaquents	Typic Haplaquents	
		Coarse silty	Gwanghwal
Inceptisols			
Aquepts	Haplaquepts	Typic Haplaquepts	
		Coarse loamy	Geumjin, Hamchang
		Fine loamy over coarse loamy	Dapyeong
		Fine silty	Poseung, Pyeongtaeg
		Aeric-Fluventic Haplaquepts	
		Coarse loamy over sandy	Seoggye
		Coarse loamy	Sachon, Gamcheon
		Fine loamy over sandy skeletal	Manseong
		Fine loamy	Sinheung
		Fine silty	Jeonbug, Yuga
		Fluventic Haplaquepts	
		Coarse loamy over sandy skeletal	Subug, Gacheon
		Coarse loamy	Yecheon, Seogcheon, Gwangpo
		Fine loamy over sandy	Gangdong

Table E 2 Continued (3)

Order/ Sub-order	Great Group	Subgroup/ Texture Family	Series
		Fine loamy	Baeggu, Jisan, Ogcheon, Hyocheon
		Coarse silty	Mangyeong, Nampyeong
		Fine silty over over sandy	Hagseong
		Fine silty over coarse loamy	Daldong, Haecheog
		Fine silty over coarse silty	Chunpo
		Fine silty	Bongrim, Sugye, Deogha, Deunggu, Gimhae
		Fine clayey over fine silty	Gimje
		Fine clayey	Gongdeog, Bongnam, Sinpyeong
		Aeric Haplaquepts	
		Coarse loamy	Hoegog
		Fine loamy	Imgog
		Fine silty over coarse silty	Miweon
		Fine silty	Gagog, Yugog
		Vertic Haplaquepts	
		Fine clayey	Seotan
Ochrepts	Dystrochrepts	Typic Dystrochrepts	
		Loamy skeletal	Cheongsan, Oesan, Ungog, Gosan, Gongsan, Masan
		Coarse loamy	Osan, Ulsan, Seongsan, Isan, Yesan, Samgag, Iweon, Jigog, Songsan

Table E 2 Continued (4)

Order/ Sub-order	Great Group	Subgroup/ Texture Family	Series
		Fine loamy	Sinjeong, Asan, Yonggye, Ugog, Guisan, Weolsan
		Fine silty	Yuha
		Aquic Dystrochrepts	
		Loamy skeletal	Tongcheon, Deoggog
		Fine loamy	Bigog
		Fluventic Dystrochrepts	
		Fine loamy	Weongog, Gamgog
		Fluvaquentic Dystrochrepts	
		Coarse loamy over sandy skeletal	Gocheon
		Coarse loamy	Noegog
		Fine loamy	Daegog
		Lithic Dystrochrepts	
		Fine loamy	Mudeung
		Lithic Ruptic-Ultic Dystrochrepts	
		Loamy skeletal	Nagsan
		Umbric Dystrochrepts	
		Coarse loamy	Mui
	Eutrochrepts	Typic Eutrochrepts	
		Loamy skeletal	Cheongsim
		Aquic Eutrochrepts	
		Loamy skeletal	Jangyu

Table E 2 Continued (5)

Order/ Sub-order	Great Group	Subgroup/ Texture Family	Series
		Aquic-Fluventic Eutrochrepts	
		Coarse loamy	Gangseo
		Fine loamy over sandy	Hagsan
		Fine loamy	Yongji
		Coarse silty	Gyuam
		Fine silty	Cheongweon, Gyeongsan
		Aquic-Dystric Eutrochrepts	
		Loamy skeletal	Weolgog
		Fine loamy	Samam
		Fluventic Eutrochrepts	
		Fine silty	Ryucheon
		Fluvaquentic Eutrochrepts	
		Loamy skeletal	Geumgog
		Coarse loamy	Eungog, Maegog
		Fine loamy	Chilgog
		Coarse silty over sandy	Opyeong
		Fine silty	Juggog, Beampyeong
		Dystric Eutrochrepts	
		Loamy skeletal	Hogye
		Coarse loamy	Imog
		Clayey skeletal	Mitan
		Lithic Eutrochrepts	
		Loamy skeletal	Daegu
		Coarse loamy	Habin
		Fine clayey	Mosan

Table E 2 Continued (6)

Order/ Sub-order	Great Group	Subgroup/ Texture Family	Series
		Dystric-Fluventic Eutrochrepts	
		Loamy skeletal	Pungcheon, Seogto
		Coarse loamy	Sangju, Imdong
		Fine loamy	Banho, Baegsan, Anmi
		Coarse silty	Ihyeon
	Fragiochrepts	Typic Fragiochrepts	
		Fine loamy	Jangweon
Umbrepts	Haplumbrepts	Typic Haplumbrepts	
		Loamy skeletal	Sinbul
		Coarse loamy	Weoljeong
		Fine loamy	Chahang
		Lithic Haplumbrepts	
		Coarse loamy	Odal
Alfisols			
Udalfs	Hapludalfs	Typic Hapludalfs	
		Fine loamy	Anryong, Buyeo
		Clayey skeletal	Banggi
		Fine clayey	Bancheon, Pyeongan, Changpyeong, Sirye, Gopyeong
		Very fine clayey	Pyeongchang
		Ultic Hapludalfs	
		Fine clayey	Chundo
		Aquic Hapludalfs	
		Fine silty	Upyeong
		Fine clayey	Geugrag, Gongseong, Hwadong, Deogpyeong

Table E 2 Continued (7)

Order/ Sub-order	Great Group	Subgroup/ Texture Family	Series
	Fragiudalfs	Aquic Fragiudalfs	
		Fine silty	Yeongog
		Fine clayey	Pogog
		Ochreptic Fragiudalfs	
		Fine loamy	Bugog
Aqualfs	Ochraqualfs	Typic Ochraqualfs	
		Fine loamy over coarse loamy	Yeongsan
		Fine clayey	Honam, Buyong
Mollisols			
Udolls	Hapludolls	Fluventic Hapludolls	
		Loamy skeletal	Maji
		Aquic-Fluventic Hapludolls	
		Sandy	Myeongji
Ultisols			
Udults	Hapludults	Typic Hapludults	
		Fine loamy	Sinhyeon, Taehwa, Songjeong, Nonsan, Daeheung, Wansan, Bongsan
		Fine clayey	Bonggye, Dalcheon, Gaghwa, Gwangsan, Gwangju, Jeonnam, Jingog
		Humic Hapludults	
		Fine loamy	Mangsil
		Fine clayey	Bansan, Ungyo, Wangsan
	Rhodudults	Typic Rhodudults	
		Fine clayey	Cheongog

Table E 3 LIST OF SOIL SERIES ASSOCIATED IN MAPPING SUBUNIT OF RECONNAISSANCE SOIL MAP

Mapping Unit	Subunit	Name of Soil Series
Soils of Fluvio-marine Plains, and Coastal Plains and Dunes		
Ft	Tidal flats	
	Fta	-
Fb	Sand and gravels, coastal beaches and dunes	
	Fba	-
Fm	Low-humic gley and alluvial soils, fluvio-marine plains	
	Fma	Deogha, Dalcong, Jeonbug, Buyong, Gimje
	Fmb	Mangyeong
	Fmc	Gwanghwal
	Fmd	Gongdeog, Hagseong
	Fmg	Gwanghwal
	Fmk	-
Soils of Flood Plains, Alluvial Plains and Narrow Valleys		
Af	Alluvial soils and riverwash, flood plains	
	Afa	Hwabong, Nagdong, Jungdong, Ihyeon
	Afb	Sindab, Hamchang, Yecheon, Seoggye
	Afc	Hwabong, Nagdong
	Afd	Hwangryong, Bonryang
Ap	Low-humic gley and alluvial soils, alluvial plains	
	Apa	Geugrag, Honam, Sinheung, Yeongsan
	Apb	Hwadong, Bancheon, Gongseong, Banggi, Jangyu
	Apc	Bonryang, Tongcheon, Hagsan, Manseong
	Apd	Gangdong, Sinpyeong
	Apg	Hogye, Imdong, Pungcheon
An	Complex of soils, narrow valleys	
	Ana	Yongji, Jisan, Hyocheon, Samam
	Anb	Tongcheon, Maryeong, Hogye
	Anc	Weolgog, Pungcheon, Hogye, Gyeongsan
	And	Gamcheon, Mui, Imog
Soils of Dilluvial Terrace		
Ra	Red-yellow podzolic soils, siliceous crystalline materials	
	Raa	Jeonnam, Gwangsan, Songjeong, Chanpyeong, Bancheon, Gwangju
	Rab	Dalcheon, Samgag, Yesan, Osan
	Rac	Gaghwa, Ungyo
	Rad	Seogto, Suam, Sinbul, Anryong
Re	Lithosols, severely eroded, siliceous materials	
	Rea	Samgag, Yesan, Songjeong

Source; Ref. E 3

Table E 3 Continued (2)

Mapping Unit	Subunit	Name of Soil Series
Rs		Lithosols and red-yellow podzolic soils, sedimentary materials
	Rsa	Daegu, Sirye, Cheongsim, Isan, Habin
	Rsb	Sirye, Banho, Buyeo
	Rsc	Banho, Pungcheon
Rv		Red-yellow podzolic and reddish brown lateritic soils, siliceomafic materials
	Rva	Mudeung, Ulsan, Cheongog, Bonggye
	Rvb	Cheongog, Jangweon
	Rvc	Seogto, Sinbul
	Rvd	-
Rl		Reddish brown lateritic soils and lithosols, calcareous materials
	Rla	Pyeongchang, Mitan, Jangseong
	Rlb	-
Rx		Alluvial and low-humic gley soils, narrow valleys between rolling lands, undifferential materials
	Rxa	Yongji, Jisan, Ogcheon, Baeggu
Soils of Strongly Dissected Hilly and Mountainous Lands		
Ma		Lithosols, siliceous crystalline materials
	Maa	Osan, Yesan, Songjeong
	Mab	Samgag, Yesan
	Mac	Gwanag, Samgag, Nagseo, Weoljeong
Ms		Lithosols, sedimentary materials
	Msa	Daegu, Habin, Cheongsim
	Msb	-
Mv		Lithosols, siliceomafic materials
	Mva	Mudeung, Oesan, Isan, Cheongog, Taehwa
	Mvb	Mudeung, Jeongja, Taehwa, Oesan, Isa
Ml		Lithosols, calcareous materials
	Mla	Jangseong, Pyeongchang
	Mlb	Jangseong, Pyeongchang
Mm		Lithosols, micaceous and hard siliceous materials
	Mma	Cheongsan, Sinjeong, Sinhyeon
	Mmb	Cheongsan, Sinjeong, Sinhyeon
Mu		Brown forest soils and lithosols, undifferentiated materials
	Mua	Mangsil, Mudeung, Sinbul, Chahang
	Mub	Odae, Chahang, Weoljeong, Mangsil
Soils of Miscellaneous Lands (RO, WR & OL)		

Table E 4 AREA EXTENT OF SOIL ASSOCIATION RECOGNIZED IN HAN RIVER BASIN

(MAPPING SUBUNIT OF RECONNAISSANCE SOIL MAP)

Unit : ha

Soil Association	Sub-Basin Code No.						
	01(1)	01(2)	02	03(1)	03(2)	04	05
Fta	9,740	4,760	-	-	-	-	-
Fba	30	80	-	-	-	-	-
Fma	6,230	1,780	-	-	-	-	-
Fmb	4,450	580	-	-	-	-	-
Fmc	450	210	-	-	-	-	-
Fmd	460	500	-	-	-	-	-
Fmg	100	-	-	-	-	-	-
Fmk	-	-	-	-	-	-	-
F-total	21,460	7,910	-	-	-	-	-
Afa	610	2,990	1,080	360	240	340	1,220
Afb	910	3,420	1,740	2,050	1,480	2,300	1,300
Afc	810	2,700	3,070	2,440	1,820	1,150	1,910
Afd	290	2,150	2,300	290	690	2,130	1,830
Apa	3,800	7,840	4,970	3,560	4,050	940	2,540
Apb	370	1,610	630	700	960	110	1,100
Apc	20	540	960	200	790	1,140	750
Apd	10	70	10	-	20	-	0
Apg	140	1,050	830	70	340	550	380
Ana	540	1,510	2,320	200	790	1,590	680
Anb	760	5,490	7,450	780	2,230	9,500	4,150
Anc	310	2,070	2,630	230	680	3,380	1,700
And	0	20	90	20	10	220	140
A-total	8,570	31,460	28,080	10,900	14,100	23,350	17,700
Raa	3,980	4,120	1,040	1,840	2,030	700	980
Rab	8,710	16,550	14,730	7,130	11,280	8,950	8,780
Rac	140	720	700	200	360	730	1,510
Rad	290	2,870	2,980	990	1,050	2,570	2,240
Rla	-	-	130	-	-	20	10
Rlb	-	-	-	-	-	-	-

Source; Ref. E 3

Table E 4 Continued (2)

(MAPPING SUBUNIT OF RECONNAISSANCE SOIL MAP)

Unit : ha

Soil Association	Sub-Basin Code No.						
	01(1)	01(2)	02	03(1)	03(2)	04	05
Rea	5,650	12,560	9,240	10,320	7,410	5,660	4,770
Rsa	-	-	-	-	30	-	-
Rsb	-	-	-	-	-	-	-
Rsc	-	-	-	-	50	-	-
Rva	20	240	-	-	-	-	-
Rvb	-	-	-	-	-	-	-
Rvc	0	30	-	-	-	-	-
Rvd	170	390	-	-	-	-	-
Rxa	7,620	10,460	7,790	7,930	7,770	3,430	4,300
R-total	26,580	47,940	36,610	28,410	29,980	22,060	22,590
Maa	100	400	1,640	120	580	420	730
Mab	3,280	14,310	17,500	5,100	6,120	16,050	7,110
Mac	2,390	33,170	29,940	5,760	9,370	42,250	20,120
Msa	10	190	70	-	630	40	240
Msb	-	-	-	-	960	-	30
Mva	110	230	-	-	-	300	-
Mvb	40	-	-	-	-	2,040	-
Mla	-	-	-	-	-	-	-
Mlb	-	-	-	-	-	-	-
Mma	3,970	3,410	3,970	-	880	620	1,190
Mmb	2,300	9,000	11,100	-	1,350	10,680	14,300
Mua	-	0	70	20	20	1,790	3,140
Mub	-	10	-	-	0	13,620	80
M-total	12,200	60,720	64,290	11,000	19,910	87,810	46,940
RO 1/	1,780	11,340	5,500	430	650	12,140	5,490
WR 2/	30	260	110	40	140	50	590
OL 3/	1,180	2,170	1,110	320	220	190	690
W-total	2,990	13,770	6,720	790	1,010	12,380	6,770
Total	71,800	161,800	135,700	51,100	65,000	145,600	94,000

Remarks ; 1/ : Rocky land

2/ : Water reservoir

3/ : Others (cities, villages, etc.)

Table E 4 Continued (3)

(MAPPING SUBUNIT OF RECONNAISSANCE SOIL MAP)

Unit : ha

Soil Association	Sub-Basin Code No.						
	06	07	08	09	10	11	12
Fta	-	-	-	-	-	-	-
Fba	-	10	-	-	160	-	-
Fma	-	0	-	-	90	-	-
Fmb	-	0	-	-	130	-	-
Fmc	-	-	-	-	-	-	-
Fmd	-	10	-	-	70	-	-
Fmg	-	-	-	-	40	-	-
Fmk	-	-	-	-	-	-	-
F-total	-	20	-	-	490	-	-
Afa	560	820	450	280	680	490	260
Afb	2,310	970	660	170	500	820	340
Afc	1,960	660	100	-	50	320	250
Afd	2,220	4,040	2,730	940	1,760	910	1,190
Apa	2,320	810	460	70	180	1,010	390
Apb	1,130	1,020	160	20	60	110	90
Apc	1,340	600	370	40	120	160	70
Apd	190	10	-	-	20	30	-
Apg	280	180	240	70	170	120	220
Ana	1,030	4,540	1,570	510	610	840	680
Anb	7,530	9,240	7,790	2,210	6,050	2,400	2,310
Anc	3,320	4,580	4,170	1,650	3,720	1,290	1,330
And	320	50	970	190	770	-	-
A-total	24,510	27,520	19,670	6,150	14,690	8,500	7,130
Raa	1,030	640	370	120	380	480	260
Rab	14,290	8,270	4,040	340	1,920	3,520	2,240
Rac	3,740	1,170	740	110	500	140	150
Rad	2,590	3,810	2,740	450	1,470	1,010	1,030
Rea	1,670	3,290	1,310	70	1,220	2,020	1,110

Table E 4 Continued (4)

(MAPPING SUBUNIT OF RECONNAISSANCE SOIL MAP)

Unit : ha

Soil Association	Sub-Basin Code No.						
	06	07	08	09	10	11	12
Rsa	260	80	60	40	240	-	-
Rsb	90	50	30	40	50	-	-
Rsc	40	120	80	10	40	-	-
Rva	70	520	20	0	110	-	-
Rvb	20	40	20	10	40	-	30
Rvc	60	1,180	220	40	10	-	-
Rvd	-	-	-	810	1,160	-	-
Rla	20	8,250	3,830	2,210	3,030	30	-
Rlb	0	1,760	1,710	260	1,120	-	-
Rxa	4,400	3,980	1,730	220	780	2,020	1,070
R-total	28,280	33,160	16,900	4,730	12,070	9,220	5,890
Maa	1,920	760	100	200	310	240	10
Mab	6,200	8,040	7,580	2,140	5,960	4,140	3,150
Mac	21,240	52,200	33,060	3,280	18,160	23,600	33,330
Msa	1,980	250	20	0	50	1,540	2,330
Msb	1,030	460	30	10	70	-	-
Mva	120	300	140	0	50	-	-
Mvb	1,710	4,650	920	780	1,660	-	-
Mla	560	8,750	3,310	21,020	29,350	-	-
Mlb	230	41,050	24,680	4,740	15,440	-	40
Mma	4,250	930	260	7,620	11,400	1,440	1,510
Mmb	22,860	34,480	18,850	4,360	11,820	6,910	13,140
Mua	6,960	1,360	3,400	1,060	3,190	50	90
Mub	0	210	18,900	11,930	25,160	90	320
M-total	69,060	153,440	111,250	57,140	122,620	38,010	53,920
RO	12,250	30,310	29,000	3,870	20,920	7,270	10,020
WR	580	240	10	-	10	10	100
OL	120	510	70	10	-	790	940
W-total	12,950	31,060	29,080	3,880	20,930	8,070	11,060
Total	134,800	245,200	176,900	71,900	170,800	63,800	78,000

Table E 4 Continued (5)

(MAPPING SUBUNIT OF RECONNAISSANCE SOIL MAP)

Unit : ha

Soil Association	Sub-unit 13	14	15(1)	15(2)	16	Total
Fta	-	-	-	-	-	14,500
Fba	-	-	-	-	-	280
Fma	-	-	-	-	-	8,100
Fmb	-	-	-	-	-	5,160
Fmc	-	-	-	-	-	660
Fmd	-	-	-	-	-	1,040
Fmg	-	-	-	-	-	140
Fmb	-	-	-	-	-	-
F-total	-	-	-	-	-	29,880
Afa	230	870	440	140	240	12,300
Afb	750	290	190	320	160	20,680
Afc	290	970	310	30	10	18,850
Afd	1,830	930	2,900	1,550	710	31,390
Apa	300	730	460	170	140	34,740
Apb	700	190	230	310	10	9,510
Apc	220	450	390	140	930	9,230
Apd	-	-	-	-	-	360
Apg	280	210	200	100	-	5,430
Ana	410	130	640	340	330	19,260
Anb	7,080	5,240	5,350	4,090	3,130	92,780
Anc	2,950	2,110	4,910	2,940	1,460	45,430
And	10	-	-	10	-	2,820
A-total	15,050	12,120	16,020	10,140	7,120	302,780
Raa	540	220	470	350	290	19,840
Rab	4,580	2,290	3,580	2,740	980	124,920
Rac	430	180	520	340	170	12,550
Rad	1,860	2,180	4,820	2,310	2,130	39,390
Rea	1,960	2,980	1,840	670	2,390	76,140
Rsa	-	-	-	-	-	710
Rsb	-	-	-	-	-	260

Table E 4 Continued (6)

(MAPPING SUBUNIT OF RECONNAISSANCE SOIL MAP)

Unit : ha

Soil Association	Sub-unit 13	14	15(1)	15(2)	16	Total
Rsc	-	-	-	-	-	340
Rva	-	-	-	-	-	980
Rvb	20	70	40	-	-	290
Rvc	-	-	-	-	-	1,540
Rvd	-	-	-	-	-	2,530
Rla	10	-	-	-	-	17,540
Rlb	-	-	-	-	-	4,850
Rxa	630	600	1,080	470	350	66,630
R-total	10,030	8,520	12,350	6,880	6,310	368,510
Maa	140	10	10	20	-	7,710
Mab	12,490	3,220	7,100	7,050	2,200	138,740
Mac	78,990	21,940	81,080	56,720	58,860	625,460
Msa	630	270	220	220	-	8,690
Msb	-	-	-	-	-	2,590
Mva	100	-	-	40	-	1,390
Mvb	240	-	10	110	-	12,160
Mla	-	-	-	-	-	62,990
Mlb	30	60	50	-	-	86,320
Mma	2,020	2,760	1,190	500	880	48,800
Mmb	6,820	41,260	11,880	340	19,560	241,010
Mua	170	400	880	390	510	23,500
Mub	1,710	450	1,990	1,450	60	75,980
M-total	103,340	70,370	104,410	66,840	82,070	1,335,340
RO	18,630	9,640	32,620	20,360	6,000	238,220
WR	80	2,190	300	-	1,350	6,090
OL	170	560	300	80	150	9,580
W-total	18,880	12,390	33,220	20,440	7,500	253,890
Total	147,300	103,400	166,000	104,300	103,000	2,290,400

Table E 5 AREA EXTENT OF SOIL ASSOCIATION RECOGNIZED IN NAGDONG RIVER BASIN

(MAPPING SUBUNIT OF RECONNAISSANCE SOIL MAP)

Unit : ha

Soil Association	Sub-Basin Code No.						
	01	02	03	04	05	06(1)	06(2)
Fta	-	-	-	-	-	-	-
Fba	110	-	-	30	-	-	-
Fma	20	-	-	40	-	-	-
Fmb	50	-	-	10	-	-	-
Fmc	0	-	-	-	-	-	-
Fmd	60	-	-	20	-	-	-
Fmg	40	-	-	-	-	-	-
Fmk	-	-	-	-	-	-	-
F-total	280	-	-	100	-	-	-
Afa	100	240	150	210	840	130	100
Afb	400	380	280	380	1,250	1,620	1,400
Afc	200	950	130	760	3,120	1,040	750
Afd	540	1,070	1,620	1,570	2,250	680	950
Apa	30	200	560	240	1,780	1,510	1,650
Apb	20	20	530	200	450	840	770
Apc	20	260	660	560	610	490	1,160
Apd	10	-	-	-	40	30	90
Apg	50	30	90	50	150	100	180
Ana	610	230	1,080	660	1,840	820	1,450
Anb	4,690	2,770	7,640	4,200	6,490	2,720	3,590
Anc	2,530	760	820	950	1,790	1,220	1,980
And	130	-	410	-	-	-	-
A-total	9,330	6,910	13,970	9,780	20,610	11,200	14,070
Raa	130	130	860	280	740	830	510
Rab	970	1,530	390	1,270	3,860	3,000	3,490
Rac	380	90	210	80	280	570	1,590
Rad	1,000	220	130	220	570	560	1,420
Rea	3,220	1,290	550	1,020	3,040	220	450
Rsa	220	460	2,200	1,050	4,900	1,640	1,110

Table E 5 Continued (2)

(MAPPING SUBUNIT OF RECONNAISSANCE SOIL MAP)

Unit : ha

Soil Association	Sub-Basin Code No.						
	01	02	03	04	05	06(1)	06(2)
Rsb	270	230	1,390	340	500	110	310
Rsc	150	80	440	170	190	40	30
Rva	80	-	140	100	110	-	230
Rvb	10	10	40	50	70	-	20
Rvc	0	-	70	30	10	10	40
Rvd	-	-	-	-	-	-	-
Rla	360	-	-	-	10	-	580
Rlb	170	-	-	-	0	-	190
Rxa	520	940	250	860	3,710	1,830	1,960
R-total	7,480	4,980	6,670	5,470	17,990	8,810	11,930
Maa	150	70	70	90	150	140	200
Mab	9,130	5,180	1,270	4,440	10,220	3,300	3,250
Mac	39,610	8,430	8,200	9,340	16,980	16,810	21,540
Msa	580	1,000	8,300	3,590	3,920	1,600	1,190
Msb	6,440	17,490	61,830	17,840	55,790	2,480	4,570
Mva	40	20	260	290	180	50	30
Mvb	480	740	7,060	4,580	2,590	1,710	890
Mla	290	-	-	0	20	-	970
Mlb	5,460	-	70	40	70	-	4,830
Mma	650	10	220	10	280	650	820
Mmb	19,140	840	6,240	670	2,290	1,610	6,920
Mua	720	-	220	30	30	20	30
Mub	90	150	1,020	370	210	-	-
M-total	82,780	33,930	94,760	41,290	92,730	28,370	45,240
RO	10,620	760	7,580	3,740	3,960	4,570	11,320
WR	10	1,320	20	20	110	50	40
OL	-	-	-	-	-	-	-
W-total	10,630	2,080	7,600	3,760	4,070	4,620	11,360
Total	110,500	47,900	123,000	60,400	135,400	53,000	82,600

Table E 5 Continued (3)

(MAPPING SUBUNIT OF RECONNAISSANCE SOIL MAP)

Unit : ha

Soil Association	Sub-Basin Code No.					
	06(3)	06(4)	North-total	05	06(1)	06(2)
Fta	-	-	-	-	-	-
Fba	-	-	140	-	-	-
Fma	-	-	60	-	-	-
Fmb	-	-	60	-	-	-
Fmc	-	-	0	-	-	-
Fmd	-	-	80	-	-	-
Fmg	-	-	40	-	-	-
Fmk	-	-	-	-	-	-
F-total	-	-	380	-	-	-
Afa	220	100	2,090	1,100	840	20
Afb	1,650	2,260	9,620	2,520	770	3,260
Afc	2,110	2,030	11,090	2,810	1,560	1,010
Afd	440	960	10,080	520	3,480	1,330
Apa	880	450	7,300	3,070	4,750	2,020
Apb	360	300	3,490	1,480	770	250
Apc	540	1,410	5,710	520	690	550
Apd	90	80	340	90	200	350
Apg	130	30	810	140	200	0
Ana	960	980	8,630	2,100	4,500	550
Anb	1,810	4,890	38,800	2,990	6,980	5,870
Anc	2,040	2,920	15,010	2,370	1,790	3,210
And	-	0	540	-	-	-
A-total	11,230	16,410	113,510	19,710	26,530	18,420
Raa	160	180	3,820	1,270	1,590	1,110
Rab	4,900	3,100	22,510	3,180	540	3,560
Rac	960	800	4,960	320	60	1,170
Rad	1,200	1,190	6,510	430	310	700
Rea	4,490	13,650	27,930	130	120	40
Rsa	950	340	12,870	290	11,620	10

Table E 5 Continued (4)

(MAPPING SUBUNIT OF RECONNAISSANCE SOIL MAP)

Unit : ha

Soil Association	Sub-Basin Code No.					
	06(3)	06(4)	North-total	05	06(1)	06(2)
Rsb	130	140	3,420	390	600	0
Rsc	0	70	1,170	70	270	0
Rva	110	-	770	30	400	-
Rvb	20	10	230	-	180	-
Rvc	30	0	190	50	160	50
Rvd	-	-	-	-	-	-
Rla	290	-	1,240	-	-	-
Rlb	90	-	450	10	10	-
Rxa	4,560	4,140	18,770	1,570	2,540	830
R-total	17,890	23,620	104,840	7,740	18,400	7,470
Maa	210	580	1,660	200	30	430
Mab	4,400	14,470	55,660	5,030	920	9,350
Mac	20,140	31,310	172,360	19,510	4,690	48,660
Msa	770	590	21,540	2,340	17,640	30
Msb	2,320	4,710	173,470	13,710	59,210	210
Mva	10	0	880	90	600	90
Mvb	100	160	18,310	340	8,170	1,310
Mla	480	-	1,760	-	-	-
Mlb	2,420	50	12,940	-	-	-
Mma	1,020	450	4,110	-	10	-
Mmb	6,630	9,290	53,630	-	40	-
Mua	60	240	1,350	80	170	100
Mub	20	40	1,900	20	470	10
M-total	38,580	61,890	519,570	41,320	91,950	60,190
RO	5,580	9,070	57,200	3,830	9,560	3,790
WR	20	10	1,600	80	160	10
OL	-	-	-	1,020	100	20
W-total	5,600	9,080	58,800	4,930	9,820	3,820
Total	73,300	111,000	797,100	73,700	146,700	89,900

Table E 5 Continued (5)

(MAPPING SUBUNIT OF RECONNAISSANCE SOIL MAP)

Unit : ha

Soil Association	Sub-Basin Code No.						
	07	08	09	10	11	12	13
Fta	-	-	-	-	-	-	-
Fba	120	-	-	-	-	-	-
Fma	180	-	-	-	-	-	-
Fmb	60	-	-	-	-	-	-
Fmc	10	-	-	-	-	-	-
Fmd	60	-	-	-	-	-	-
Fmg	-	-	-	-	-	-	-
Fmk	-	-	-	-	-	-	-
F-total	430	-	-	-	-	-	-
Afa	60	2,350	2,250	1,330	1,160	90	250
Afb	120	750	690	1,900	2,150	550	290
Afc	40	-	1,360	1,770	2,320	420	890
Afd	600	4,700	1,440	1,410	1,620	1,990	400
Apa	360	3,860	4,840	1,890	1,430	1,010	900
Apb	700	5,690	1,090	620	210	560	0
Apc	310	1,400	1,400	820	330	430	20
Apd	-	-	10	80	80	-	-
Apg	180	1,380	250	80	10	0	10
Ana	660	5,970	2,300	2,930	2,060	670	700
Anb	830	2,650	1,470	2,950	4,440	3,220	2,040
Anc	210	1,350	2,350	3,370	2,980	7,010	1,980
And	-	390	-	-	-	-	-
A-total	4,070	30,490	19,450	19,150	18,790	15,950	7,480
Raa	450	1,740	740	710	410	420	70
Rab	100	270	390	1,620	1,280	1,170	110
Rac	70	-	100	190	310	2,400	90
Rad	10	140	90	240	350	1,230	270
Rea	10	90	-	40	30	750	-
Rsa	1,180	9,880	3,460	1,030	860	160	450

Table E 5 Continued (6)

(MAPPING SUBUNIT OF RECONNAISSANCE SOIL MAP)

Unit : ha

Soil Association	Sub-Basin Code No.						
	07	08	09	10	11	12	13
Rsb	50	240	490	140	70	40	120
Rsc	30	330	40	20	0	-	-
Rva	190	90	40	20	-	-	-
Rvb	120	90	10	30	10	-	-
Rvc	70	350	60	30	10	-	-
Rvd	-	-	-	-	-	-	-
Rla	-	-	-	-	-	-	-
Rlb	-	-	10	10	-	-	-
Rxa	410	4,320	2,400	1,050	600	150	60
R-total	2,690	17,540	7,830	5,130	3,930	6,320	1,170
Maa	20	-	280	1,080	900	700	580
Mab	190	400	1,810	3,260	3,190	4,970	1,030
Mac	880	6,820	6,660	25,650	24,390	45,810	9,520
Msa	4,010	29,290	4,820	3,880	5,630	1,380	3,920
Msb	3,880	28,010	6,350	12,890	16,620	3,770	14,180
Mva	610	300	170	90	10	-	-
Mvb	4,600	6,040	2,990	1,470	780	1,420	300
Mla	10	-	-	-	-	-	-
Mlb	-	-	-	190	420	-	-
Mma	40	310	-	150	180	200	-
Mmb	30	300	-	610	810	1,940	190
Mua	50	370	210	280	150	20	60
Mub	10	90	-	-	70	50	130
M-total	14,330	71,930	23,290	49,550	53,150	60,260	29,910
RO	1,940	10,520	3,080	2,350	1,680	9,920	1,410
WR	40	420	120	30	30	20	40
OL	-	-	630	590	520	30	90
W-total	1,980	10,940	3,830	2,970	2,230	9,970	1,540
Total	23,500	130,900	54,400	76,800	78,100	92,500	40,100

Table E 5 Continued (7)

(MAPPING SUBUNIT OF RECONNAISSANCE SOIL MAP)

Unit : ha

Soil Association	Sub-Basin Code No. 14	Central-total	15(1)	15(2)	16	17
Fta	-	-	-	-	-	-
Fba	-	120	-	-	-	50
Fma	-	180	400	-	740	1,690
Fmb	-	60	40	-	70	1,630
Fmc	-	10	20	-	-	100
Fmd	-	60	160	-	20	60
Fmg	-	-	-	-	-	210
Fmk	-	-	-	-	-	370
F-total	-	430	620	-	830	4,110
Afa	1,640	11,090	260	0	2,590	1,910
Afb	770	13,770	340	540	520	1,580
Afc	2,690	14,870	2,350	200	4,940	2,510
Afd	540	18,030	3,050	1,820	1,500	1,060
Apa	5,300	29,430	2,190	1,230	5,240	9,730
Apb	300	11,670	150	290	200	1,080
Apc	690	7,160	130	800	320	2,260
Apd	-	810	10	-	30	60
Apg	150	2,400	20	10	220	50
Ana	2,440	24,880	3,680	1,890	7,150	2,510
Anb	3,220	36,660	6,170	3,910	5,890	2,340
Anc	2,920	29,540	6,000	6,990	1,610	4,710
And	80	470	20	0	-	60
A-total	20,740	200,780	24,370	17,680	30,210	29,860
Raa	250	8,760	240	390	290	380
Rab	60	12,280	900	2,560	130	310
Rac	210	4,920	420	1,420	110	650
Rad	80	3,850	1,340	3,060	20	240
Rea	10	1,220	110	1,140	30	60
Rsa	4,750	33,690	2,230	10	7,000	4,110
Rsb	160	2,300	110	0	260	60

Table E 5 Continued (8)

(MAPPING SUBUNIT OF RECONNAISSANCE SOIL MAP)

Unit : ha

Soil Association	Sub-Basin Code No. 14	Central-total	15(1)	15(2)	16	17
Rsc	50	810	0	10	60	30
Rva	10	780	490	20	240	1,190
Rvb	10	450	720	30	10	180
Rvc	50	830	620	70	70	60
Rvd	-	-	-	-	-	-
Rla	-	-	-	-	-	-
Rlb	-	40	-	-	-	-
Rxa	1,050	14,980	680	3,320	790	780
R-total	6,690	84,910	7,860	12,030	9,010	8,050
Maa	210	4,430	920	1,400	0	180
Mab	610	30,760	4,950	6,990	1,060	420
Mac	5,670	198,260	36,420	42,310	310	5,700
Msa	9,440	82,380	15,680	230	33,380	6,370
Msb	26,510	185,340	13,080	240	27,890	9,000
Mva	30	1,990	1,270	190	130	1,950
Mvb	2,890	30,310	12,590	5,210	3,850	11,930
Mla	-	10	-	-	-	-
Mlb	70	680	-	-	-	-
Mma	20	910	330	460	-	-
Mmb	130	4,050	1,160	3,900	-	-
Mua	100	1,590	160	30	60	30
Mub	90	940	400	10	210	340
M-total	45,770	541,650	86,960	60,970	66,890	35,920
RO	6,160	54,240	6,640	11,210	10,570	17,790
WR	530	1,480	50	10	130	570
OL	910	3,910	100	-	460	1,400
W-total	7,600	59,630	6,790	11,220	11,160	19,760
Total	80,800	887,400	126,600	101,900	118,100	97,700

Table E 5 Continued (9)

(MAPPING SUBUNIT OF RECONNAISSANCE SOIL MAP)

Unit : ha

Soil Association	Sub-Basin Code No. 18	19	South-total	Basin-total
Fta	-	-	-	-
Fba	100	30	180	440
Fma	3,540	110	6,480	6,720
Fmb	3,470	20	5,230	5,350
Fmc	330	-	450	460
Fmd	90	20	350	490
Fmg	340	-	550	590
Fmk	770	-	1,140	1,140
F-total	8,640	180	14,380	15,190
Afa	510	1,280	6,550	19,730
Afb	2,490	1,290	6,760	30,150
Afc	1,270	1,250	12,520	38,480
Afd	850	5,130	13,410	41,520
Apa	5,210	5,980	29,580	66,310
Apb	400	2,090	4,210	19,370
Apc	1,540	3,430	8,480	21,350
Apd	20	70	190	1,340
Apg	-	380	680	3,890
Ana	710	6,520	22,460	55,970
Anb	1,720	3,260	23,290	98,750
Anc	3,080	7,510	29,900	74,450
And	-	10	90	1,100
A-total	17,800	38,200	158,120	472,410
Raa	1,160	330	2,790	15,370
Rab	790	160	4,850	39,640
Rac	560	610	3,770	13,650
Rad	440	370	5,470	15,830
Rea	150	50	1,540	30,690
Rsa	60	1,880	15,290	61,850
Rsb	-	210	640	6,360

Table E 5 Continued (10)

(MAPPING SUBUNIT OF RECONNAISSANCE SOIL MAP)

Unit : ha

Soil Association	Sub-Basin Code No. 18	19	South-total	Basin-total
Rsc	-	230	330	2,310
Rva	1,900	460	4,300	5,850
Rvb	950	320	2,210	2,890
Rvc	90	120	1,030	2,050
Rvd	-	-	-	-
Rla	-	-	-	1,240
Rlb	-	-	-	490
Rxa	430	580	6,580	40,330
R-total	6,530	5,320	48,800	238,550
Maa	250	110	2,860	8,950
Mab	1,300	1,370	16,090	102,510
Mac	9,510	10,090	104,340	474,960
Msa	30	6,420	62,110	166,030
Msb	780	23,510	74,500	434,610
Mva	1,980	1,650	7,170	10,040
Mvb	24,670	24,370	82,620	131,240
Mla	-	-	-	1,770
Mlb	-	130	130	13,750
Mma	-	110	900	5,920
Mmb	-	50	5,110	62,790
Mua	570	180	1,030	3,970
Mub	430	1,210	2,600	5,440
M-total	39,520	69,200	359,460	1,421,980
RO	17,360	31,250	94,820	206,260
WR	60	110	930	2,710
OL	2,190	440	4,590	8,500
W-total	19,610	31,800	100,340	217,470
Total	92,100	144,700	681,100	2,365,600

Table E 6 AREA EXTENT OF SOIL ASSOCIATION RECOGNIZED IN SEOMJIN RIVER BASIN

(MAPPING SUBUNIT OF RECONNAISSANCE SOIL MAP)

Unit : ha

Soil Association	Sub-Basin Code No.					
	01	02	03	04	05	Total
Fta	-	-	-	-	-	-
Fba	-	20	-	-	-	20
Fma	580	910	-	50	430	1,970
Fmb	50	-	-	0	30	80
Fmc	160	60	-	-	-	220
Fmd	800	2,270	-	10	60	3,140
Fmg	-	20	-	-	-	20
Fmb	-	-	-	-	-	-
F-total	1,590	3,280	-	60	520	5,450
Afa	50	120	60	120	30	380
Afb	130	260	610	560	300	1,860
Afc	1,470	130	180	240	120	2,140
Afd	980	2,270	1,380	2,140	1,360	8,130
Apa	2,110	4,360	940	1,330	1,230	9,970
Apb	1,210	810	380	520	210	3,130
Apc	120	1,580	910	1,530	780	4,920
Apd	10	-	-	60	100	170
Apg	240	270	80	250	180	1,020
Ana	2,120	4,640	1,550	4,310	2,580	15,200
Anb	3,390	5,840	3,010	7,530	6,180	25,950
Anc	7,640	2,880	2,140	2,400	4,380	19,440
And	-	-	-	-	-	-
A-total	19,470	23,160	11,240	20,990	17,450	92,310
Raa	570	1,150	670	680	380	3,450
Rab	1,030	4,350	2,250	2,470	1,870	11,970
Rac	780	1,270	1,730	1,260	700	5,740
Rad	950	1,240	1,590	1,370	1,000	6,150
Rea	280	250	860	570	190	2,150
Rsa	930	830	-	210	480	2,450

Table E 6 Continued (2)

(MAPPING SUBUNIT OF RECONNAISSANCE SOIL MAP)

Unit : ha

Soil Association	Sub-Basin Code No.					
	01	02	03	04	05	Total
Rsb	300	400	0	150	200	1,050
Rsc	340	420	10	90	100	960
Rva	70	720	-	300	270	1,360
Rvb	30	320	-	620	370	1,340
Rvc	60	520	60	390	270	1,300
Rvd	-	-	-	-	-	-
Rla	-	-	-	-	-	-
Rlb	-	-	-	-	-	-
Rxa	1,280	1,420	3,800	2,710	910	10,120
R-total	6,620	12,890	10,970	10,820	6,740	48,040
Maa	980	2,360	960	3,030	1,710	9,040
Mab	5,470	3,260	5,000	5,740	4,100	23,570
Mac	54,790	52,180	33,350	30,980	11,450	182,750
Msa	2,930	2,030	90	2,310	3,020	10,380
Msb	3,930	7,240	130	7,270	10,690	29,260
Mva	1,230	1,480	80	840	600	4,230
Mvb	3,400	10,140	150	13,830	10,640	38,160
Mla	-	-	-	-	-	-
Mlb	-	-	-	-	-	-
Mma	10	820	190	280	570	1,870
Mmb	90	6,020	1,280	3,060	2,480	12,930
Mua	240	130	20	50	120	560
Mub	-	290	-	-	10	300
M-total	73,070	85,950	41,250	67,390	45,390	313,050
RO	12,010	6,510	2,930	6,320	5,950	33,720
WR	30	130	10	250	250	670
OL	150	10	-	-	-	160
W-total	12,190	6,650	2,940	6,570	6,200	34,550
Total	112,940	131,930	66,400	105,830	76,300	493,400

Table E 7 PROFILE DESCRIPTION OF REPRESENTATIVE PADDY SOILS (GIMJE SERIES)

Profile Description

Ap1g -- 0 to 9 cm. Light brownish gray (2.5YR 6/2) dry, grayish brown (2.5YR 5/2); silty clay loam; many fine to coarse prominent strong brown (7.5YR 5/8) and common fine to medium distinct yellowish brown (10YR 5/8) mottles; puddled, structureless (massive); hard, sticky and plastic; common discontinuous random inped dendritic tubular pores; many fine to medium dead rice and fine living grass roots; clear smooth boundary; pH 5.0; hardness 30.

Ap2g -- 9 to 18 cm. Gray to dark gray (10YR 5/1-4/1) dry, grayish brown (10YR 5/2); silty clay loam; many fine to medium prominent strong brown (7.5YR 5/8) mottles; crushed color light olive brown (2.5Y 5/4); weak medium to coarse platy structure; patchy thin clayey cutans; hard, sticky and plastic; common continuous random inped and exped vertical tubular pores; roots as above; clear smooth boundary; pH 5.5; hardness 26.

B1g -- 18 to 28 cm. Gray (10YR 5/1) silty clay; many distinct fine to medium yellowish brown (10YR 5/8) inped mottles; crushed color dark grayish brown (10YR 4/2); strong medium to coarse prismatic structure; continuous thick gray (10YR 5/1) clayey cutans; very firm, sticky and olastic; common fine to medium random inped and exped simple tubular pores; common roots as above; clear smooth bountary; pH 6.0; hardness 20.

B2g -- 28 to 49 cm. Gray (5YR 5/1) clay; many prominent medium to coarse brown to dark brown (7.5YR 4/4) and common prominent coarse to medium yellowish red (5YR 5/8) inped mottles; crushed color dark grayish brown (10YR 4/2); moderately coarse prismatic structure; continuous thick gray (5YR 5/1) clayey cutans; firm, very sticky and very plastic; pores as above; roots as above; abrupt smooth boundary; pH 6.0; hardness 18.

C1g -- 49 to 67 cm. Black (2.5Y N2/) silty clay loam; few coarse yellowish red (5YR 5/8) and few coarse reddish brown (7.5YR 4/4) inmass mottles; crushed color very dark gray (10YR 3/1); structureless (massive); firm, sticky and plastic; few pores as above; few roots as above; gradual smooth boundary; pH 6.0; hardness 17.

C2g -- 67 to 82 cm. Gray (10YR 5/1) silty clay loam; many prominent strong brown (7.5YR 5/6) inmass mottles; crushed color bark grayish brown (2.5Y 4/2); structureless (massive); sticky and slightly plastic; common coarse pores as above; few very fine mica flakes; fine to coarse dead reed roots and stems; clear smooth boundary; pH 6.0; hardness 18.

Source; Ref. E 10

C3g -- 82 to 130 cm. Light greenish gray (10G 7/1) silt loam; many fine to coarse prominent yellowish brown (10YR 5/8) and common prominent medium to coarse yellowish red (5YR 5/8) inmass mottles; crushed color olive (5Y 5/3); firm, slightly sticky and nonplastic; pores as above; many fine mica flakes; roots as above; clear smooth boundary; pH 6.0.

c4g -- 130 to 250 cm. Greenish gray silt loam; no mottles; few coarse slightly decomposed reed stems, roots and woody pieces.

Range in Characteristics

Solum thickness ranges from 50 to 100 cm of fine clayey continental or leached fluvio-marine mineral soil overlying up to 20 cm of buried peaty mineral soil which overlies greenish gray, bluish gray or gray fine clayey to fine silty fluvio-marine and continental materials, probably stratified and with significant salt content. The base saturation is generally more than 60 percent and the reaction is near neutral in the field but decreases somewhat when dried. Apg horizons are grayish brown, gray, light brownish gray, plive gray or dark gray heavy silty clay loam to silty clay with hues of 2.5Y or 5Y, values of 4 to 6 and chromas of less than 2. Many to common yellowish brown, reddish brown,yellowish red and strong brown $FeCo_3$ mottles usually occur in the lower Apg and upper Bg horizons and diminish with depth. Silty clay Apg textures occasionally occur and farmers sometimes add sandy material to improve the workability. Cambic Bg horizons are grayish brown, gray or dark gray heavy silty clay loam, silty clay or clay with hues of 2.5Y or 5Y, values of less than 5 and chromas of 2 or less. Many or common olive, yellowish brown and some strong brown inped mottles may occur. Bg horizons are weakly expressed as some alluvial stratification is evident and the characteristic moderate to strong prismatic structure with continuous gray clayey cutans is considered due mainly to cracks forming during dry serasons. The cutans are probably due mainly to the incorporation of Apg materials into prism cracks by cultivation and irrigation water. The peaty layers, occurring between 50 and 100 cm depth, are mostly 10 to 20 cm thick, black, dark gray or brown silty clay, heavy silty clay loam or light clay mineral soil with verying amounts of organic matter and peat which ranges from about 1 to 30 percent marsh reeds, roots and stems. Cg horizons are commonly stratified silty clay to silt with hues of greenish gray 7.5GY to 10G, bluish gray 5PG to 10PG and gray N with values of 3 to 6 and chromas of 1 or less. Few or no mottles occur in Cg horizons.

Setting

The Gimje soils occur on level to nearly level middle and lower fluvio-marine plains, in back swamps and old channel positions where slopes are less than 2 percent.

Drainage and Permeability

The Gimje soils have imperfect drainage, very slow permeablility and very slow runoff. The water table, between 50 and 100 cm, is in and below the peaty layer most of the time except during the rainy season when paddy rice is produced. The water table and runoff are largely controlled by artificial methods.

Use and Vagetation

All areas are used for flooded rice paddy during wet summers and most areas are also used for nonirrigated barley during the dry winter and spring seasons.

Distribution and Extent

The Gimje soils are of moderate extent and occur in the south and south-west coastal plain areas.

(JEONBUG SERIES)

Profile Description

Ap1g -- 0 to 10 cm. Dark gray (5Y 4/1) silt loam; puddled, structureless (massive); many fine to medium prominent yellowish brown (10YR 5/8) inmass mottles; friable, slightly sticky and slightly plastic; common fine dendritic pores; common very fine mica; abundant fine to medium dead rice roots; abrupt smooth boundary; pH 5.0.

Ap2g -- 10 to 19 cm. Gray (5Y 5/1) silt loam; weak coarse platy structure; common fine to medium prominent yellowish red (5YR 5/8) and olive brown (2.5Y 4/2) mottles; firm, sticky and plastic; common fine vertical tubular pores; common fine mica; common fine dead rice roots; clear smooth boundary; pH 5.5.

B1g -- 19 to 27 cm. Dark gray (5Y 5/1) silt loam; weak coarse prismatic structure; many fine prominent yellowish red (5YR 5/8) mottles; firm, sticky and plastic; patchy thin cutans; pores and mica as above; few fine dead rice roots; clear smooth boundary; pH 6.0.

B21g -- 27 to 44 cm. Very dark gray (10YR 3/1) silty clay loam; weak coarse prismatic structure breaking to moderate coarse and medium subangular blocky; common fine to medium distinct yellowish brown (10YR 5/8) mottles; firm, sticky and plastic; continuous thin cutans; few fine pores; common fine mica flakes; few fine dead rice roots; abrupt wavy boundary; pH 7.0.

B22g -- 44 to 85 cm. Mottled yellowish brown (10YR 5/8), olive gray (5Y 5/2) and strong brown (7.5YR 5/8) silty clay loam; weak coarse prismatic structure breaking to weak coarse blocky; crushed color olive brown (2.5Y 4/4); firm, sticky and plastic; common fine to medium soft very dark brown (10YR 2/2) Mn mottles; continuous thick very dark grayish brown (10YR 3/2) cutans; many fine to coarse pores; mica as above; roots as above; diffuse smooth boundary; pH 7.0.

B3g -- 85 to 120 cm. Olive gray (5Y 4/2) silt loam; structureless (massive) breaking to weak coarse prismatic; common medium prominent dark yellowish brown (10YR 4/4) mottles; firm, sticky and plastic; continuous thick cutans; common fine to coarse pores; many fine mica flakes; no roots; diffuse smooth boundary; pH 7.0.

C1g -- 120 to 160 cm. Dark gray (5Y 4/1) silt loam; structureless (massive); common fine to medium faint olive gray (5Y 4/2) mottles; sticky and plastic; few fine pores; common fine mica flakes; diffuse smooth boundary; pH 8.0.

C2g -- 160 to 200 cm. Dark greenish gray (10YR 4/1) wet, silt loam; structureless (massive); no mottles; no cutans; sticky and plastic; no pores; many fine mica flakes; pH 8.5.

Range in Characteristics

Solum thickness ranges from 75 to 125 cm and depth to hard rock is probably more than 5 meters. Except for the Apg horizons which range from strongly to medium acid unless limed, reaction is slightly acid to neutral and increases with depth. Common to many fine mica flakes are throughout the profiles. Apg horizons are 20 to 30 cm thick, dark grayish brown, gray or olive gray silt loam or silty clay loam with many or common yellowish brown, yellowish red, strong brown or browish yellow mottles. Cambic B horizons are dominantly yellowish brown, dark yellowish brown, brown, olive brown or light olive brown silty clay loam or silt loam with common or many distinct or prominent gray, dark gray, dark grayish brown, grayish brown or very dark grayish brown mottles. Cg horizons are gray, dark gray, bluish gray or greenish gray silt loam, silty clay loam or silt mildly to strongly alkaline weakly stratified marine materials.

Setting

Level to nearly level broad fluvio-marine plains. Slopes range from 0 to 2 percent and average about 0.5 percent.

Drainage and Permeability

Impertectly drained. Permeability is probably moderately slow. Natural runoff is ponded or very slow. Runoff is largely artificially controlled.

Use and Vegetation

Most areas of these soils are double cropped with paddy rice during wet summer and barley during dry winter and spring seasons.

Distribution and Extent

The Jeonbug soils are of large extent and are distributed in the southwest coastal plain areas.

(MANGYEONG SERIES)

Profile Description

Aplg -- 0 to 10 cm. Gray (5Y 5/1) silt loam; common fine distinct brown to dark brown (7.5YR 4/4) mottles; puddled; dries and breaks to weak medium granular structure; friable, slightly sticky and slightly plastic; many fine white mica; many fine and medium roots; abrupt smooth boundary; pH 5.5.

Ap2g -- 10 to 21 cm. Gray (5Y 5/1) silt loam; common medium and coarse distinct yellowish brown (10YR 5/6) and brown to dark brown (7.5YR 4/4) mottles; weak coarse platy structure; firm, slightly sticky and slightly plastic; many fine white mica; few fine vertical tubular pores; many fine roots; abrupt smooth boundary; pH 6.0.

Blg -- 21 to 70 cm. Gray (5Y 5/1) silt loam; common medium and coarse distinct strong brown (7.5YR 5/6) mottles; crushed color light olive brown (2.5Y 5/4); weak coarse prismatic structure breaking to weak coarse blocky; slightly sticky and slightly plastic; common medium and coarse pores; many fine white mica; few fine roots; clear smooth boundary; pH 8.0.

B2 -- 70 to 86 cm. Grayish brown (2.5Y 5/2) very fine sendy loam; common prominent strong brown (7.5YR 5/6), yellowish red (5YR 4/6) and brown to dark brown (10YR 4/3) mottles; crushed color brown (10YR 5/3); weak coarse prismatic structure breaking to weak fine platy; thin continuous gray (2.5Y 5/2) exprism cutans; slightly sticky and nonplastic; many medium and fine mica; few medium pores; no roots; clear smooth boundary; pH 8.5.

C1g -- 86 to 125 cm. Gray (5Y 5/1) silt loam to very fine sandy loam; mottles as above; structureless (massive); firm, slightly sticky and nonplastic; few very coarse pores; abrupt wavy boundary; pH 8.5.

C2g -- 125 to 170 cm. Dark greenish gray (5GY 4/1) very fine sandy loam; structureless (massive); less firm than above; slightly sticky and slightly plastic; no mottles; pH 8.5.

C3g -- 170 to 220 cm. Dark greenish gray (10GY 4/1) silt loam; structureless (massive); firm, slightly sticky and slightly plastic.

Range in Characteristics

Solum thickness ranges from 50 to 100 cm and depth to bedrock is probably more than 5 meters. The clay content is less than 18 percent and less than 15 percent is coarser than very fine sand. Base saturation is commonly more than 60 percent. Reaction is strongly to medium acid in the A and midly to moderately alkaline in the B and Cg horizons. Common to many fine white and yellow mica occur throughout the profiles. Apg horizons are 20 to 30 cm thick dark grayish brown, grayish brown, light brownish gray, light gray or gray silt loam or loam with mottles. Cambic B horizons are dominantly mottled gray, dark grayish brown, grayish brown, light olive gray, olive gray or dark gray and strong brown, yellowish brown, yellowish red or brown to dark brown silt loam, loam, very fine sandy loam or silt with prismatic structure. The Cg horizons are dark gray, greenish gray or very dark gray silt, silt loam, loam or fine sandy loam with massive structure and few or no mottles.

Setting

The Mangyeong soils are on level to nearly level fluvio-marine plains and are derived from stratified coarse silty fluvio-marine materials. Dominant slopes are about 0.5 percent and the range is from 0 to 2 percent.

Drainage and Permeability

Imperfectly drained. Permeability is very slow. Runoff is artificially controlled as all areas are terraced and dyked for paddy rice land use. The artificial water table generally is about 75 cm or below.

Use and Vegetation

Most areas are used for rice during wet seasons and about one half is used for barley during dry winter and spring seasons.

Distribution and Extent

The Mangyeong soils are of large extent in the plains of the country.

(PYEONGTAEG SERIES)

Profile Description

Ap -- 0 to 15 cm. Olive gray (5Y 4/2) silt loam; common fine to medium prominent mottles of yellowish red (10YR 4/6); crushed colors are yellowish brown (10YR 5/8); structureless (massive); friable, sticky and plastic; few fine pores; common fine roots; clear smooth boundary; pH 6.5.

B1g -- 15 to 27 cm. Olive gray (5Y 4/2) silt loam; common fine to medium distinct mottles of yellowish brown (10YR 4/4); crushed colors are brown to dark brown (10YR 4/3); weak coarse platy structure; friable, sticky and plastic; common fine pores; few fine roots; clear smooth boundary; pH 6.0.

B21g -- 27 to 52 cm. Olive gray (5Y 4/2) silt loam; common fine to medium prominent mottles of dark yellowish brown (10YR 3/4); crushed colors are dark yellowish brown (10YR 4/4); weak fine to medium angular blocky structure; firm, sticky and plastic; common fine to medium pores; few fine roots; clear smooth boundary; pH 5.7.

B22g -- 52 to 70 cm. Dark grayish brown (2.5Y 4/2) silty clay loam; common fine to medium prominent mottles of dark brown (7.5YR 3/2); crushed colors are dark yellowish brown (10YR 4/4); moderate medium to coarse prismatic structure; firm, very sticky and very plastic; common fine pores and roots; abrupt smooth boundary; pH 5.7.

B3g -- 70 to 90 cm. Olive gray (5Y 4/2) silty clay loam; common fine to medium prominent mottles of strong brown (7.5YR 5/6); crushed colors are brown to dark brown (10YR 4/3); weak medium to coarse prismatic structure; very sticky and very plastic; common fine pores; no roots; clear smooth boundary; pH 6.0.

Cg -- 90 to 120 cm. Dark grayish brown (2.5Y 4/2) silty clay loam; no mottles; structureless (massive); firm, sticky and plastic; common fine pores; no roots; few fine pores; pH 6.0.

Range in Characteristics

Solum thickness ranges from 50 to 100 cm and depth to hard rock is generally more than 3 meters. Base saturation is generally more than 60 percent. Reaction is strongly to slightly acid. Ap horizons are grayish brown, dark grayish brown, gray or olive gray loam or silt loam. Cambic Bg horizons have gray, dark gray or olive gray silt loam or silt clay loam with common prominent strong brown or yellowish brown mottles. Cg horizons are grayish brown, dark grayish or dark brown silt loam or silty clay loam. Sometimes stratified sandy loam, loam or black macky layers occur.

Setting

The Pyeongtaeg soils occur on level to nearly level, broad continental alluvial plains which contact fluvio-marine plains and source materials are medium textured alluvial materials. Slopes are usually less than 2 percent.

Drainage and Permeability

The Pyeongtaeg soils are imperfectly drained. Permeability and runoff are slow. The groundwater level occurs generally between 70 and 80 cm.

Use and Vegetation

Most of these soils are used for rice paddy.

Distribution and Extent

The Pyeongtaeg soils are of moderate extent and are distributed along the broad alluvial plains of the main continental rivers throughout the contry.

Table E 7 Continued (9)

(SINHEUNG SERIES)

Profile Description

Ap -- 0 to 12 cm. Light olive brown (2.5Y 5/4) silt loam; common fine distinct strong brown (7.5YR 5/6) mottles; crushed color light olive brown (2.5Y 5/4); puddled structureless (massive); friable, nonsticky and nonplastic; abrupt smooth boundary; pH 5.0.

A1g -- 12 to 32 cm. Dark gray to gray (5Y 4.5/1) silt loam; few medium distinct strong brown (7.5YR 5/6) mottles; crushed color olive gray (5Y 5/2); weak coarse platy and some blocky structure; friable, slightly sticky and slightly plastic; abrupt smooth boundary; pH 6.0.

B1 -- 32 to 54 cm. Faintly mottled brown (10YR 4/3) and grayish brown (10YR 5/2) silt loam; weak coarse prismatic structure breaking to weak coarse platy structure in upper part; few medium distinct yellowish brown (10YR 5/6) inprism and thin gray (10YR 5/1) exprism mottles; crushed color dark grayish brown to grayish brown (2.5Y 4.5/2); slightly firm, slightly sticky and slightly plastic; few fine discontinuous random inped tubular pores; abrupt smooth boundary; pH 6.5.

B2g -- 54 to 97 cm. Dark grayish brown (10YR 3/2) silty clay loam; common medium distinct inprism yellowish brown (10YR 5/6) mottles; weak to moderate coarse prismatic structure; firm, sticky and plastic; moderately thick discontinuous gray (5Y N5/) exprism cutans; common very fine continuous vertical exprism cutans; common very fine continuous vertical exped tubular simple pores; abrupt smooth boundary; pH 6.5.

Cg -- 97 to 140 cm. Stratified dark grayish brown (2.5Y 4/2) sandy loam; few medium faint olive brown (2.5Y 4/4) mottles; friable, slightly sticky and slightly plastic; pH 6.5.

Range in Characteristics

Solum thickness ranges from 50 to 100 cm. Reaction is strongly to slightly acid. Ap or A1 horizons are grayish brown, dark grayish brown, dark gray or light olive brown silt loam, loam, fine sandy loam or very fine sandy loam in paddy. Cambic B horizons have common or many distinct or prominent mottles of various hues including brown, grayish brown, dark grayish brown, gray or very dark gray. The texture of B horizons is dominantly loam, silt loam, light clay loam, light silty clay loam or heavy fine sandy loam. There is little evidence of clay accumulation. Cg horizons are grayish brown, dark grayish brown or gray weakly stratified silt loam, silty clay loam or fine sandy loam with olive brown or brown mottles below 60 to 100 cm. Textures commonly are coarser with depth.

Setting

The Sinheung soils occur on level to nearly level undissected broad continental alluvial plains. Slopes are less than 2 percent.

Drainage and Permeability

Imperfectly drained. Permeability is moderately slow. Runoff is slow. The groundwater table fluctuates chiefly between about 30 and 80 cm except where artificially controlled.

Use and Vegetation

Most areas are used both for non-irrigated barley during the dry winter and spring seasons and flooded rice during wet summer season.

Distribution and Extent

The Sinheung soils are of moderate extent and occur on broad alluvial plains along the main continental rivers.

(HAMCHANG SERIES)

Profile Description

Ap1g -- 0 to 15 cm. Light olive brown (2.5Y 5/6) silt loam; common fine faint yellowish brown (10YR 5/6) mottles; crushed color light olive brown (2.5Y 5/4); puddled structure breaking to weak fine and coarse granular; friable, slightly sticky and slightly plastic; common fine mica; few fine discontinuous oblique inmass dendritic tubular pores; common fine living and dead grass roots; gradual smooth boundary; pH 5.0.

Ap2g -- 15 to 30 cm. Light olive gray (5Y 6/2) silt loam; many medium to coarse distinct yellowish brown (10YR 5/8) mottles; crushed color pale brown (10YR 6/3); weak coarse subangular blocky and platy structure; firm, sticky and plastic; mica as above; very fine to fine continuous exped simple tubular pores; common very fine and fine living and dead roots; gradual wavy boundary; pH 5.5.

B2g -- 30 to 40 cm. Gray (10Y 4/1) silt loam; common medium to coarse prominent dark yellowish brown (10YR 4/4) mottles; crushed color olive (5Y 4.5/3); weak coarse prismatic structure; friable, sticky and plastic; mica as above; many medium and coarse continuous exped vertical simple tubular pores; many coarse living and dead roots; diffuse smooth boundary; pH 6.5.

B3g -- 40 to 60 cm. Gray (10Y 5/1) silt loam; few fine prominent dark yellowish brown (10YR 4/4) mottles; crushed color gray (10Y 5/1); weak coarse prismatic structure breaking to weak subangular blocky; friable, sticky and very plastic; mica as above; few fine continuous exped vertical simple tubular pores; many medium root channels; clear smooth boundary; pH 6.3.

C1g -- 60 to 100 cm. Gray (10Y 5/1) sandy loam; common medium to coarse olive brown (2.5Y 4/4) mottles along root channels; crushed color olive gray (10Y 4/2); structureless (massive); slightly sticky and plastic; mica as above; few very coarse continuous vertical exped simple tubular pores; many coarse root channels; includes a very thin olive brown (2.5Y 5/6) sand layer; diffuse smooth boundary; pH 6.0.

C2g -- 100 to 150 cm. Olive gray (5Y 5/2) very fine sandy loam; structureless (massive); slightly sticky and slightly plastic; mica as above; few pores; few roots in upper part; pH 6.5.

Range in Characteristics

Solum thickness ranges from 50 to 100 cm and depth to hard rock is probably greater than 5 meters. Base saturation is more than 60 percent. Reaction is strongly to medium acid. Common fine white and yellow mica occur throughout the profile. Clay content is less than 18 percent and more than 15 percent is coarser than very fine sand. Apg horizons are light olive brown, grayish brown, light olive gray, light gray, gray, grayish brown or dark grayish brown silt loam or loam with common yellowish brown, storng brown or dark yellowish brown mottles. Cambic Bg horizons are dark gray, dark grayish brown or grayish brown sandy loam, silt loam or loam with a few olive brown mottles.

Setting

The Hamchang soils are developed on continental alluvial plains in stratified alluvial materials. They frequently occur near dyked stream channels which are filled with sands to levels higher than the adjacent alluvial plains. Dominant slopes are about 0.5 percent and range from 0 to 2 percent.

Drainage and Permeability

Poorly drained. Permeability is probably moderate and runoff is ponded or very slow. The groundwater table is near the surface except where artifically controlled.

Use and Vegetation

Most of these soils are used for paddy rice.

Distribution and Extent

The Hamchang soils are of small extent and are distributed on broad alluvial plains throughout the country.

(SINDAB SERIES)

Profile Description

Ap -- 0 to 12 cm. Olive brown (2.5Y 4/4) fine gravelly coarse sand; common coarse faint grayish brown (2.5Y 5/2) mottles; crushed color light olive brown (2.5Y 5/4); structureless (single grain); loose, nonsticky and nonplastic; about 20 percent quartz grit; common fine roots; gradual smooth boundary; pH 6.5.

C1g -- 12 to 40 cm. Olive gray (5Y 4/2) fine gravelly coarse sand; structureless (single grain); loose, nonsticky and nonplastic; about 15 percent quartz grit; few fine roots; gradual smooth boundary; pH 6.0.

C2g -- 40 to 80 cm. Light olive gray (5Y 6/2) fine gravelly coarse sand; structureless (single grain); loose, nonsticky and nonplastic; about 10 percent quartz grit; few fine roots; diffuse smooth boundary; pH 6.5.

Range in Characteristics

Depth over strongly contrasting layers is more than one meter and depth over hard rock is 3 to 5 meters or more. Base saturation is more than 60 percent. Reaction is medium to strongly acid. Ten to 35 percent quartz grit occurs throughout the profiles. Ap horizons are 10 to 25 cm thick, grayish brown, dark grayish brown, olive brown, gray or light gray sand, loamy sand, coarse sand or sandy loam. Cg horizons are commonly shades of gray, grayish brown, light olive gray or dark gray fine gravelly sand, loamy sand, coarse sand or loamy coarse sand. Thin

strata of other textures may occur. In general textures are coarser with depth.

Setting

The Sindab soils are formed in coarse textured sandy alluvium on alluvial plains, frequently in old stream channels and also in areas adjacent to dyked stream channels where the stream bed is higher than the alluvial plains. They also occur in narrow valley alluvium and below lakes commonly where seepage water and springs occur. Dominant slopes are about 1 percent and slope range is from 0 to 7 percent.

Drainage and Permeability

Poorly drained. Permeability is very rapid and runoff if ponded or very slow. The groundwater table is at or near the suface most of the year except where artificially controlled. Most areas are dyked and terraced for rice paddy, thus flooding is no particular hazard in most broad alluvial palin areas.

Use and Vegetation

Most areas are used for paddy rice.

Distribution and Extent

The Sindab soils are of moderate extent and are distributed along the main rivers and in local valley alluvial plains, mainly in granitic areas throughout the country.

(HONAM SERIES)

Profile Description

Ap1 -- 0 to 10 cm. Olive gray (5Y 5/2) wet, silt loam; common fine prominent strong brown (7.5YR 5/6) mottles; puddled, structureless (massive); friable, sticky and plastic; many fine rice roots; abrupt smooth boundary.

Ap2g -- 10 to 16 cm. Olive gray (5Y 4/2) wet, silt loam; few fine prominent dark brown (7.5YR 4/4) mottles; weak coarse blocky and platy structure; friable, sticky and plastic; common fine rice roots; clear smooth boundary.

B1tg -- 16 to 23 cm. Olive gray (5Y 5/2) silty clay loam; common fine prominent yellowish red (5YR 4/6) mottles; moderate coarse prismatic structure breaking to moderate coarse angular blocky; thin coninuous exprism clay cutans; firm, very sticky and very plastic; few fine rice roots; clear smooth boundary.

B21tg-- 23 to 35 cm. Dark gray (5Y 4/1) silty clay; common medium prominent yellowish brown (10YR 5/6) inprism mottles; moderate coarse prismatic structure breaking to strong coarse and medium angular blocky; thin continuous clayey cutans; firm, very sticky and very plastic; few fine rice roots; gradual smooth boundary.

B22tg-- 35 to 53 cm. Dark gray (5Y 4/1) silty clay ; common fine prominent strong brown (7.5YR 5/6) inprism mottles; moderate coarse prismatic structure breaking to strong coarse angular blocky; thin continuous grayish brown (10YR 5/2) clayey cutans; frim, very sticky and very plastic; few fine rice roots; gradual smooth boundary.

B23tg-- 53 to 120 cm. Very dark gray (5Y 3/1) wet, silty clay; many coarse prominent brown (7.5YR 5/4) inprism mottles; weak coarse prismatic structure with continuous gray clayey cutans; frim, very sticky and very plastic; no roots.

Range in Characteristics

Solum thickness ranges from 100 to 150 cm or more and depth to hard rock is probably more than 5 meters. Base saturation is more than 60 percent. Reaction is medium increasing to neutral in the lower horizons. Apg horizons are thin or moderately thick gray, grayish brown, dark grayish brown or olive gray silt loam, silty clay loam or loam with yellowish red, strong brown or yellowish brown mottles. Btg horizons are olive gray, grayish brown or dark gray silty clay, silty clay loam, clay or clay loam with yellowish brown, strong brown, yellowish red or reddish brown mottles. Cg horizons are gray, dark gray or dark grayish brown silty clay, clay or silty clay loam weakly stratified.

Setting

The Honam soils occur on level to nearly lev low river terraces on broad alluvial plains in stratified continent luvial materials. Slopes are dominantly about 0.5 percent and range from 0 to 2 percent.

Drainage and Permeability

Imperfectly drained. Permeability is very slow and runoff is very slow.

Use and Vegetation

Most areas are used for paddy rice and some of the artificially drained areas are used also for barley or wheat.

Distribution and Extent

The Honam soils are of relatively large extent and occur on broad alluvial plains throughout the country.

(HWADONG SERIES)

Profile Description

Ap1g -- 0 to 15 cm. Grayish brown (2.5Y 4/2) silty clay loam; few fine faint light olive brown mottles; puddled, structure breaking to moderate medium granular; friable, sticky and plastic; many fine grass roots; few fine pores; abrupt smooth boundary; pH 5.2.

Ap2g -- 15 to 20 cm. Grayish brown (2.5Y 5/2) silty clay loam; many medium and coarse prominent yellowish red (5YR 4/6) inmass mottles; crushed color yellowish brown to dark yellowish brown (10YR 5/4-4/4); structureless (massive); friable, sticky and plastic; common fine grass roots; common fine pores; clear smooth boundary; pH 5.6.

B1g -- 20 to 40 cm. Dark grayish brown (10YR 4/2) silty clay loam; common fine faint yellowish brown (10YR 5/6) mottles; many fine to medium brittle Mn concretions; crushed color brown to yellowish brown (10YR 5/3.5); moderate medium prismatic structure breaking to moderate medium subangular blocky; firm, sticky and plastic; thin gray (10YR 4/1) clay cutans on prisms; common fine roots and pores; gradual irregluar boundary; pH 6.2.

B2t -- 40 to 90 cm. Strong brown (7.5YR 5/6) silty clay; many medium faint yellowish brown (10YR 5/4) mottles; crushed color brown to yellowish brown (10YR 5/5); moderate coarse prismatic structure breaking to moderate medium to fine subangular blocky;

firm, very sitcky and very plastic; thin brown (10YR 5/4) clayey cutans; common fine pores; clear wavy boundary; pH 6.5.

B3t -- 90 to 150 cm. Yellowish red (5YR 5/8) silty clay; many medium distinct pale brown (10YR 6/3) and common medium distinct black inprism (Mn) mottles; moderate very coarse prismatic structure diminshing with depth; firm, very sticky and very plastic; few coarse pores; thick light brownish gray (2.5 N2/) clay cutans on prisms becomes more gray with depth; pH 6.6.

Range in Characteristics

Soil reaction ranges from strongly acid to slightly acid and base saturation exceeds 60 percent. Solum thickness is 125 to 150 cm or more and depth to hard rock is generally more than 3 meters. Apg horizons are 10 to 20 cm thick dark grayish brown to grayish brown silt loam, clay loam and silty clay loam with strong brown and yellowish red mottles where used for paddy rice or brown to dark brown where used for upland crops. B1 horizons are dark grayish brown or grayish brown silty clay loam or clay loam with yellowish brown, strong brown or yellowish red mottles in paddy. Crushed colors of B1 horizons are brown to yellowish brown. B2t horizons are yellowish red, strong brown or reddish brown silty clay, light clay, heavy clay loam or heavy silty clay loam. When in rice paddy, Bt horizons have a layer more than 10 cm thick free of mottles of 2 chroma or less. This layer normally is between 40 and 70 cm. Thick B3 horizons beginning between 70 and 125 cm are similar to B2 horizons except for having 2 chroma or less mottles. C horizons have paler colors and contain more gray mottles than B3 horizons. They are yellowish brown, strong brown or yellow with common gray and few red mottles. They may be silty clay loam, silty clay or clay loam with minor strata of other textures and contain few or no pebbles.

Setting

The Hwadong soils occur on nearly level to sloping terraces formed in slight to moderately dissected continental old alluvium derived from mixed materials. Dominant slopes are 2 to 7 percent and the range is from 2 to 15 percent.

Drainage and Permeability

Moderately well drained. Permeability is very slow and runoff is very slow as most areas are level terraced and dyked for paddy rice land use.

Use and Vegetation

Most areas of these soils are used for flood irrigated rice during wet summer and non-irrigated barley, wheat or vegetables during the dry winter and spring seasons.

Distribution and Extent

The soils of the Hwadong series occur along the major rivers and streams throughout the country, particularly where they join. The extent is small.

(SACHON SERIES)

Profile Description

Ap1g -- 0 to 6 cm. Very dark grayish brown (10YR 3/2) loam; few fine faint strong brown (7.5YR 5/6) mottles; puddled structure; dries and breaks to weak medium granular; friable, slightly sticky and slightly plastic; many very fine and medium dead rice roots; abrupt smooth boundary; pH 5.5.

Ap2g -- 6 to 15 cm. Dark grayish brown to very dark grayish brown (10YR 3.5/2) loam; few fine distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky and coarse platy structure; firm, slightly sticky and slightly plastic; common fine and medium continuous vertical inped simple tubular pores; common fine and medium roots; clear wavy boundary; pH 6.2.

A3g -- 15 to 30 cm. Dark gray (10YR 4/1) loam; many fine prominent yellowish red (5YR 4/6) mottles; crushed color brown to dark brown (10YR 3/4); weak coarse prismatic structure breaking to weak medium subangular blocky; firm, sticky and plastic; thin patchy dark grayish brown exprism cutans; many fine and medium continuous vertical inped simple tubular pores; few fine and medium roots; clear wavy boundary; pH 6.3.

B -- 30 to 66 cm. Dominantly strong brown (7.5YR 5/8) loam; common moderately thick continuous dark grayish brown (10YR 4/2) exprism cutans and mottles; crushed color yellowish brown (10YR 5/4); weak coarse prismatic structure; firm, slightly sticky and slightly plastic; many fine and medium continuous vertical inped and exped simple tubular pores; gradual wavy boundary; pH 6.5.

Cg -- 66 to 130 cm. Dark grayish brown (10YR 4/2) mottles; common medium distinct strong brown (7.5YR 5/8) mottles; crushed color yellowish brown (10YR 5/4); weak coarse prismatic structure becoming structureless (massive) and weakly stratified below 80 cm; firm, slightly sticky and slightly plastic; many fine and medium continuous vertical inped simple tubular pores.

Range in Characterictics

Solum thickness ranges from 50 to 100 cm and depth to hard rock is greater than 3 meters. Base saturation is more than 60 percent in the control section. Reaction is strongly to medium acid in surface, medium to slightly acid in B horizons and slightly acid to neutral in C horizons. There are few to common mica flakes throughout. Ap horizons are 20 to 3C cm thick very dark grayish brown, dark grayish brown, grayish brown or gray loam, sandy loam or silt loam with distinct or prominent mottles. Cambic B horizons are yellowish brown, dark yellowish brown or strong brown sandy loam, loam or silt loam with weak coarse prismatic structure and thin continuous or discontinuous gray, grayish brown, dark grayish brown or olive gray exprism cutans. C horizons are usually grayish brown weakly stratified sandy loam and loam with strong brown mottles.

Setting

The Sachon series occurs in gently sloping to sloping narrow local valley alluvium derived from coarse loamy granitic soil materials. Dominant slopes are 2 to 15 percent and the range is from 2 to 30 percent.

Drainage and Permeability

The Sachon soils have imperfect drainage, moderately rapid permeability and slow runoff as essentially all areas are level terraced for paddy rice land use.

Use and Vegetation

The Sachon soils are used for flood irrigated paddy rice and non-irrigated barley.

Distibution and Extent

The Sachon series is of small extent and is distributed in narrow local valleys throughout the granitic areas of the country.

Table E 7 Continued (19)

(JISAN SERIES)

Profile Description

Ap1g -- 0 to 12 cm. Dark grayish brown (2.5Y 4/2) loam; common medium prominent strong brown (7.5YR 5/6) mottles; weak medium granular structure; friable, slightly sticky and slightly plastic; few fine mica; many fine rice roots; abrupt smooth boundary.

Ap2g -- 12 to 30 cm. Olive gray (5Y 5/2) light clay loam; few fine prominent dark yellowish brown (10YR 4/4) mottles; weak coarse platy and medium subangular blocky structure; firm, sticky and plastic; common fine pores; common fine mica; clear smooth boundary; pH 5.5.

B2g -- 30 to 65 cm. Grayish brown (2.5Y 5/2) clay loam common fine faint brown (10YR 5/8) mottles; crushed color light olive brown (2.5Y 5/4); weak very coarse prismatic structure; thin discontinuous gray exprism cutans; common fine pores; common fine mica; clear smooth boundary.

B3g -- 65 to 100 cm. Gray (5Y 5/1) light clay loam; many medium prominent yellowish brown (10YR 5/8) mottles; moderate coarse prismatic structure decreasing with depth; firm, sticky and plastic; thin broken grayish brown (2.5Y 5/2) exprism cutans; common fine mica; abrupt smooth boundary; pH 6.5.

Cg -- 100 to 170 cm. Very dark gray (5Y 3/1) loam; few yellowish brown mottles; structureless (massive); slightly sticky and slightly plastic.

Range in Characteristies

Solum thickness ranges from 75 to 125 cm and depth to hard rock is generally more than 3 meters. Base saturation is more than 60 percent. Reaction is medium to slightly acid. Common mica is present. Apg horizons are 20 to 30 cm thick grayish brown, dark grayish brown, light gray or gray silt loam, loam, clay loam or silty clay loam with prominent yellowish red, strong brown or yellowish brown mottles. Bg horizons are 50 to 100 cm deep gray, grayish brown, dark grayish brown, very dark grayish brown or olive gray loam, clay loam or silty clay loam with common prominent yellowish red, red, strong brown, yellowish brown or reddish brown mottles. Clay content of Bg horizons ranges from 18 to 35 percent. Cg horizons are gray, grayish brown, very dark grayish brown or dark grayish brown stratified silty clay loam, loam or loamy sand with mottles. Some layers contain gravel.

Setting

The Jisan soils occur in gently sloping to sloping narrow local valleys and on fans in alluvium derived from granitic, andesite, porphyry and similar materials. Dominant slopes are 2 to 7 percent and slope range is from 2 to 30 percent.

Drainage and Permeability

Imperfectly drained. Permeability is probably moderate or moderately slow and runoff is controlled as all areas are level terraced and dyked for paddy rice land use.

Use and Vegetation

All areas are used for paddy rice during wet summer season. Many areas are used also for barley or wheat during dry winter season.

Distribution and Extent

The Jisan soils are of moderate extent and are distributed in local valleys throughout the granitic and porphyry areas of the country.

(OGCHEON SERIES)

Profile Descreption

Ap1g -- 0 to 9 cm. Grayish brown (2.5Y 5/2) loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; structureless (massive); friable, slightly sticky and slightly plastic; few fine white mica; many fine to medium dead rice roots; clear smooth boundary; pH 5.2.

Ap2g -- 9 to 20 cm. Dark gray (5Y 4/1) loam; few medium to coarse distinct dark yellowish brown (10YR 4/4) mottles and few coarse prominent red (2.5YR 4/8) mottles; structureless (massive); firm, slightly sticky and slightly plastic; few fine white mica; few quartz sand; common fine dead rice roots; abrupt smooth boundary; pH 6.8.

ABg -- 20 to 32 cm. Dark gray (5Y 4/1) loam; very few fine to medium faint olive brown (2.5Y 4/4) mottles; structureless (massive); firm, slightly sticky and slightly plastic; common fine white mica; few fine root holes; few fine ferrous carbonate ($FeCO_3$) mottles; few fine and very fine roots; gradual smooth boundary; pH 6.8.

B1g -- 32 to 62 cm. Dark gray (5Y 4/1) silt loam; weak very coarse prismatic structure; firm, sticky and plastic; few fine white mica; common fine root holes; few medium ferrous carbonate ($FeCO_3$) mottles; few very fine roots; gradual smooth boundary; pH 6.7.

B2g -- 62 to 90 cm. Very dark gray (5Y 3/1) silt loam; weak very coarse prismatic structure; firm, sticky and plastic; few fine white mica; common fine root holes; few medium ferrous carbonate ($FeCO_3$) mottles and soft concretions; few very fine roots; gradual smooth boundary; pH 6.5.

Cg -- 90 to 130 cm. Dark gray (5Y 4/1) loam; structureless (massive); firm, slightly sticky and slightly plastic; few fine pores; common fine to medium white mica; few fine ferrous carbonate ($FeCO_3$) mottles and soft concretions; few quartz sand; pH 6.8.

Range in Characteristics

Solum thickness ranges from 50 to 100 cm. Depth to hard rock is greater than 2 meters. Base saturation is more than 60 percent. Reaction is strongly acid to medium acid when moist and slightly acid to neutral when dry in laboratory. Apg horizons are grayish brown or dark grayish brown with dark yellowish brown mottles. Textures of Apg horizons are mainly loam or silt loam. Cambic Bg horizons are gray, dark gray or very dark gray silt loam, silty clay loam or clay loam with few ferrous carbonate ($FeCO_3$) mottles and soft concretions sometimes occur. Cg horizons are dark gray or very dark gray silt loam, loam or fine sandy loam with sometimes ferrous carbonate mottles and soft concretions. Few to common fine mica is generally throughout the profile.

Setting

The Ogcheon soils are in dominantly gently sloping local alluvial valleys where seepage water and high water tables occur and in nearly level local alluvial valleys adjacentts fluvio-marine plain with high water table. Slopes range from 0 to 15 percent but dominant slopes are 2 to 7 percent.

Drainage and Permeability

Poorly drained. Runoff is very slow to ponded. Permeability is generally moderately slow. The water table is genreally on or near the surface except where artificially controlled.

Use and Vegetation

Most of these areas are used for one annual crop of flooded paddy rice.

Distribution and Extent

The Ogcheon soils are of small extent and occur in local valleys throughout the country.

Table E 8 PROFILE DESCRIPTION OF REPRESENTATIVE UPLAND SOILS (BONRYANG SERIES)

Profile Description

Ap -- 0 to 20 cm. Dark brown (10YR 3/3) sandy loam; weak fine and medium granular structure; friable, slightly sticky and slightly plastic; common fine living roots; abrupt smooth boundary.

A1 -- 20 to 44 cm. Brown to dark brown (10YR 4.5/3) sandy loam; structureless (massive) breaking to fine and medium granular structure; friable, slightly sticky and slightly plastic; few fine living roots; gradual wavy boundary.

C1 -- 44 to 60 cm. Brown to dark brown (10YR 4/3) sandy loam; structureless (massive) breaking to medium granular; friable, slightly sticky and slightly plastic; abrupt wavy boundary.

C2 -- 60 to 100 cm. Brown (10YR 5/3) fine gravelly loamy coarse sand; structureless (single grain); loose, nonsticky and nonplastic; approximately 20 percent fine quartz gravel.

Range in Characteristics

Soil depth is greater than 150 cm and depth to hard rock is generally more than 5 meters. Base saturation is more than 60 percent in the control section. Reaction is strongly to medium acid except where limed, increasing slightly with depth. Ap horizons are thin to moderately thick brown, dark brown or dark yellowish brown (yellowish brown or pale brown when dry) sandy loam, fine sandy loam or loam. Upper C horizons are moderately deep brown to dark brown, brown, pale brown, yellowish brown, dark yellowish brown, brownish yellow or light yellowish brown sandy loam, coarse sandy loam, fine sandy loam or loam with less than 18 percent clay and a few gravel pieces. Lower C horizons below 50 to 100 cm are dark yellowish brown, yellowish brown, pale brown, brown or light yellowish brown gravelly loamy coarse sand, sand or loamy sand.

Setting

The Bonryang soils are on level to nearly level broad alluvial plain river levees in stratified coarse textured continental alluvial materials. Dominant slopes are about one percent and slope range is less than 2 percent.

Drainage and Permeability

Well drained. Runoff is moderately slow to slow and permeability is rapid to moderately rapid.

Source; Ref. E 10

Table E 8 Continued (2)

Use and Vegetation

Most areas are used for upland crops such as peanuts, cabbage, spinach, squash, melon, lettuce, Spainsh lettuce, eggplant and similar non-irrigated crops.

Distribution and Extent

The Bonryang soils are of moderate extent and are distributed on alluvial plains adjacent to river channels throughout the granitic areas of the country.

(NAGDONG SERIES)

Profile Description

Ap -- 0 to 12 cm. Yellowish brown (10YR 5/4) loamy fine sand; structureless (single grain); loose, nonsticky and nonplastic; many fine mica flakes; many fine roots; gradual smooth boundary.

C -- 12 to 120 cm. Yellowish brown (10YR 5/4) loamy fine sand; structureless (single grain); loose, nonsticky and nonplastic; many fine mica flakes.

Range in Characteristics

Soil depth is in excess of 150 cm and probably ranges to 3 meters or more over any very contrasting materials. Soils contain common to many mica flakes. Except where heavily limed, reaction ranges from extremely acid to medium acid. Base saturation is more than 60 percent. A horizons range from 10 to 20 cm thick brown to dark yellowish brown or yellowish brown loamy fine sand, loamy sand or fine sandy loam. C horizons are brown or yellowish brown loamy fine sand to fine sand. C horizons contain less than 18 percent clay. Minor strata of coarse sandy or silty materials may occur.

Setting

The Nagdong soils occur on nearly level to very gently sloping undissected continental broad alluvial flood plain levees chiefly adjacent to river channels and on the convex side of river bends. Slopes range from 0 to 2 percent with about 1 to 2 percent gentle undulations dominating.

Drainage and Permeability

Somewhat excessively drained permeability is rapid to very rapid. Runoff is slow. The water table is probably below 150 cm.

Use and Vegetation

Most areas are used for crops such as peanuts, rye and melon. Millet, buck wheat, some Chinese cabbage and poplar trees are grown in limited quantities. Only a very small extent is idle.

Distribution and Extent

The Nagdong soils are of moderate extent and occur on the larger flood plains throughout the country.

(IHYEON SERIES)

Profile Description

Ap1 -- 0 to 11 cm. Brown to dark brown (10YR 4/3) silt loam; common fine distinct strong brown (7.5YR 5/8) mottles; weak and moderate fine granular structure; friable, slightly sticky and slightly plactic; common fine mica; common fine barley roots; abrupt smooth boundary; pH 5.5.

Ap2 -- 11 to 20 cm. Brown to dark brown (10YR 4/3) silt loam; common fine faint dark yellowish brown (10YR 4/4) mottles; weak medium platy structure; firm, slightly sticky and slightly plastic; common fine rice roots; clear smooth boundary; pH 5.0.

B -- 20 to 80 cm. Dark yellowish brown to yellowish brown (10YR 4/4-5/4) silt loam; weak coarse subangular blocky structure breaking to moderate and fine granular; firm, slightly sticky and slightly plastic; few fine worm holes and casts; many fine random tubular pores; common fine mica; few fine barley roots; clear smooth boundary; pH 5.5.

C1 -- 80 to 110 cm. Dark yellowish brown (10YR 4/4-3/4); weakly stratified silt loam and very fine sandy loam; structureless (massive); friable, slightly sticky and slightly plastic; common fine mica; few fine vesicular pores; pH 6.0.

C2 -- 110 to 140 cm. Dark yellowish brown (10YR 3.5/4) silt loam; weakly stratified; common fine yellow and white mica.

Table E 8 Continued (4)

Range in Characteristics

Solum thickness is commonly more than 100 cm over contrasting strata. Depth over hard rock is probably more than 5 meters. Reaction is strongly acid to slightly acid increasing somewhat with depth. Few to common fine mica occur. The organic matter content ranges chiefly between 0.5 and 2.5 percent being highest in A horizons. Ap horizons are 20 to 30 cm thick brown to dark brown or dark yellowish brown when in irrigated rice paddy. Apg horizons are dark grayish brown to grayish brown mainly silt loam ranging to light silty clay loam or very fine sandy loam. Cambic B horizons, 80 to 125 cm thick, are brown to dark brown or dark yellowish brown silt loam, loam or silt with less than 18 percent clay, weak blocky structure and more yellow colors and less organic matter than A horizons. This strata of fine loamy or fine silty textures may occur. C1 horizons are dark yellowish brown or brown stratified silt loam, fine sandy loam, loam or silt. Typically gray mottles and other evidence of fluctuating ground water occur below 125 cm depths though they may range to 100 cm. Few brown or dark brown soft concretions and mottles are characteristic.

Setting

Level to nearly level slightly dissected broad continental alluvial plains mainly in levee positions on the concave side of river bends. Slopes range from 0 to 2 percent.

Drainage and Permeability

Well dranined. Runoff is slow and permeability is probably moderately slow.

Use and Vegetation

These soils are used chiefly for leafy vegetables, barley, peanuts and similar crops. Paddy rice is sometimes grown where irrigation water is abundant.

Distribution and Extent

The Ihyeon soils occur in the major river valleys throughout the country, mostly in wide alluvial plains.

Table E 8 Continued (5)

(BANCHEON SERIES)

Profile Description

Ap1 -- 0 to 11 cm. Brown to dark brown (10YR 4/3) silty clay loam; few fine to medium faint strong brown (7.5YR 5/6) mottles; moderate fine and medium granular structure; friable, sticky and plastic; many fine roots; abrupt smooth boundary.

Ap2 -- 11 to 21 cm. Yellowish brown (10YR 5/6) silty clay loam; common fine faint brown to dark brown (7.5YR 4/4) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; few fine pores; common fine roots; clear smooth boundary.

B21t -- 21 to 40 cm. Yellowish red (5YR 4/6) silty clay; moderate coarse prismatic breaking to moderate coarse subangular blocky structure; moderately thick continuous brown to dark brown clay cutans; few soft medium Mn concretion; firm, sticky and plastic; few fine and medium pores; few fine roots; clear wavy boundary.

B22t -- 40 to 80 cm. Yellowish red (5YR 4/6) silty clay; moderate coarse prismatic structure breaking to moderate medium subangular blocky; moderately thick continuous reddish brown clay cutans; firm, sticky and plastic; pores as above; no roots; clear wavy boundary.

B3 -- 80 to 110 cm. Mottled yellowish red (5YR 5/8) and strong brown (7.5YR 5/6) silty clay loam; crushed color strong brown (7.5YR 5/6) weak prismatic structure breaking to weak coarse subangular blocky; common medium soft Mn concretions; thin continuous clay cutans on prism faces; about 7 percent weathered round granitic gravel.

Range in Characteristics

Solum thickness ranges from 100 to 150 cm and depth to hard rock is more than 2 meters. Base saturation is more than 60 percent. Reaction is medium to slightly acid. Ap or A1 horizons are brown, dark yellowish brown or reddish brown silt loam, loam, clay loam or silty clay loam. The finer surface textures generally occur in eroded areas. Apg horizons occur in areas used for paddy rice for several years or more. Argillic Bt horizons are yellowish red, red, reddish brown or reddish yellow silty clay, clay, heavy silty clay loam or heavy clay loam containing between 35 and 60 percent clay. C horizons are yellowish red, yellowish brown or strong brown stratified silty clay loam, silty clay, clay loam, sandy clay loam or loam with less than 35 percent gravel. Source materials are mainly granitic soils.

Setting

The Bancheon soils occur on very gently sloping to undulating and some rolling moderately dissected river and fan terraces of old pediplane systems and are developed in deep old alluvial materials. The larger areas occur in the vicinity of the confluence of main streams. Dominant slopes are 7 to 15 percent and the slope range is from 2 to 30 percent.

Drainage and Permeability

Well drained. Permeability is slow and runoff is medium to rapid depending on slope and land use.

Use and Vegetation

Most areas are used for barley, wheat, soybean, red pepper, sweet potato, tobacco, red bean and similar non-irrigated crops. Some areas are used for flood irrigated rice where sufficient water is available.

Distribution and Extent

The Bancheon soils are of rather large extent, are agriculturally important and are distributed throughout the country along the main rivers.

(HWANGRYONG SERIES)

Profile Description

Ap -- 0 to 14 cm. Brown (10YR 5/3) gravelly loamy sand; moderate medium granular structure; loose, nonsticky and nonplastic; about 15 percent round mainly granite gravel and cobbles; gravel and many very fine and fine biutite and muscovite mica flakes; common fine and coarse living roots; clear smooth boundary; pH 5.5.

C -- 14 to 150 cm. Very pale brown (10YR 7/4) very gravelly and very cobbly coarse sand; structureless (single grain); about 50 percent round gravel and cobbles as above; few fine and medium living roots; pH 5.5.

Range in Characteristics

Generally 10 to 35 percent gravel occur above 50 cm and 35 to 90 percent gravel stratified with sand and loamy sand commonly increasing with depth occur in the substrata. Base saturation is more than 60 percent. Base saturation is more than 60 percent. Reaction is medium to slightly acid throughout the profiles. A1 or Ap horizons usually less than 20 cm thick are brown, dark brown or dark yellowish brown gravelly and/or cobbly loam, sand, sandy loam or sand. When used for rice paddy, the surface is mottled grayish brown, dark grayish brown or gray due to reduction under irrigation water. C horizons are brownish yellow, light yellowish brown, pale brown or very pale brown very gravelly and/or very cobbly loamy sand or sand.

Setting

The Hwangryong soils are on level to nearly level flood plains adjacent to stream or river channels and on large alluvial fans in mountainous areas. Source materials are derived dominantly from soils formed in granitic, schist, phyllite, andesite, porphyry and to less extent shale areas. Dominant slopes are about 1 or 2 percent and the range is from 0 to 7 percent.

Drainage and Permeability

Somewhat excessively drained. Very rapid permeability. Runoff is slow.

Use and Vegetation

About 80 percent is used for non-irrigated upland crops such as barley, soybean, mulberry and orchard. Paddy rice is grown only to a limited extent, usually in areas where streams can be diverted through the paddies. A few areas are idle.

Distribution and Extent

The Hwangryong soils are of moderate extent and occur along the continental portion of most rivers in mountainous areas.

Table E 8 Continued (8)

(PUNGCHEON SERIES)

Profile Description

Ap -- 0 to 15 cm. Brown to dark brown (10YR 4/3) gravelly loam; moderate fine to medium granular structure; friable, slightly sticky and slightly plastic; many fine to medium soybean roots; about 30 percent gravel; clear smooth boundary; pH 5.5.

B1 -- 15 to 35 cm. Brown to dark brown (10YR 4/3) very gravelly loam; weak fine to medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine soybean roots; about 50 percent gravel; gradual smooth boundary; pH 6.0.

B2 -- 35 to 70 cm. Dark yellowish brown (10YR 4/4) very gravelly loam; weak medium subangualr blocky structure; friable, slightly sticky and slightly plastic; few very fine roots; about 60 percent cobbles; gradual smooth boundary; pH 6.5.

C -- 70 to 100 cm. Dark yellowish brown (10YR 4/4) very gravelly sandy loam; structureless (massive); friable, nonsticky and nonplastic; more than 80 percent gravel or cobbles; pH 6.5.

Range in Characteristics

Solum thickness ranges from 50 to 100 cm and depth to bed rock is more than 3 meters in most places and probably ranges from 2 to 5 meters or more. Base saturation is more than 60 percent. Reaction is medium to slightly acid and becomes less acid with depth. Gravel and cobble content is generally 35 to 80 percent throughout the profile. The clay content of the control section is less than 18 percent. A horizons are 10 to 20 cm thick and are brown, dark brown and dark yellowish brown gravelly loam, sandy loam or silt loam. Cambic B horizons are brown, dark brown, dark yellowish brown, brownish yellow, light yellowish brown or yellowish brown very gravelly soil with loam, silt loam, fine sandy loam, sandy loam or coarse sandy loam with weakly developed. C horizons are yellowish brown, brown, dark brown, light yellowish brown or dark yellowish brown very gravelly sandy loam, fine sandy loam, coarse sandy loam, loam or silt loam.

Setting

The Pungcheon soils occur on very gently slopes to gently sloping alluvial fans, small valleys and footslopes and are formed in alluvial-colluvial materials derived from acidic crystalline and sedimentary rocks. Dominant slopes are 2 to 7 percent and range from 0 to 15 percent.

Drainage and Permeability

Well drained. Runoff is medium to slow and permeability is moderately rapid.

Use and Vegetation

Most of these soils are used for upland crops such as soybean, barley, Chinese cabbage, onion, millet and red peper.

Distribution and Extent

The Pungcheon soils are of moderate extent and are distributed in small valleys, fan terraces and foot slopes throughout the country.

(DAEGOG SERIES)

Profile Description

Ap -- 0 to 15 cm. Dark yellowish brown (10YR 3.5/4) loam; weak fine to medium granular structure; friable, slightly sticky and plastic; few fine pores; common fine to medium mica and roots; diffuse smooth boundary.

B1 -- 15 to 30 cm. Dark yellowish brown (10YR 4/4) loam; weak medium to coarse subangular blocky structure; friable, slightly sticky and plastic; mica as above; common fine to medium pores; few fine roots; clear smooth boundary.

B2 -- 30 to 55 cm. Brown to dark brown (7.5YR 4/4) loam; weak fine to medium subangular blocky structure; friable, sticky and plastic; many fine to medium pores; mica as above; very few fine roots; diffuse smooth boundary.

B3 -- 55 to 75 cm. Brown to dark brown (7.5YR 4/4) loam; common fine to medium distinct grayish brown (2.5Y 5/2) mottles; weak medium subangular blocky structure; friable, sticky and plastic; many fine to medium pores; mica as above; few fine black Mn mottles; clear smooth boundary.

C -- 75 to 120 cm. Mottled yellowish brown (10YR 5/4), dark yellowish brown (10YR 3.5/4), grayish brown (2.5Y 5/2) loam; crushed color dark yellowish brown (10YR 4/4); weak fine to medium subangular blocky structure; friable, sticky and plastic; common fine pores; mica as above.

Range in Characteristics

Solum thickness ranges from 50 to 100 cm and depth to hard rock is greater than 200 cm. Quartz grits are less than 10 percent throughout the profile. Base saturation is less than 60 percent. Reaction is very strongly to strongly acid except A horizons. Fine mica occurs throughout the profile. A horizons are brwon to dark brown or dark yellowish brown sandy loam, loam or silt loam. Thickness of A horizons ranges from 10 to 20 cm. Cambic B horizons are brown to dark brown, yellowish brown, dark yellowish brown or strong brown loam, silt loam, clay loam or silty clay loam. Clay content of cambic B horizons are between 18 to 35 percent. Lower part of cambic B horizons have grayish brown mottles. C horizons are stratified grayish brown, dark grayish brown, yellowish brown or dark yellowish brown silt loam, loam, clay loam or sandy loam with massive structure.

Setting

The Daegog soils occur in gently sloping to sloping local valley alluvial plains, footslope and alluvial fan positions in materials washed mainly from yellowish red granitic soils. Dominant slopes are 2 to 7 percent and range from 2 to 30 percent.

Drainage and Permeability

Moderately well drained. Runoff is medium depending on slope gradient and permeability is generally moderately slow.

Use and Vegetation

Most areas are used for cultivated upland crops such as barley, soybean, red pepper, sweet potato, cabbage, raddish and similar non-irrigated upland crops. Paddy rice is rarely grown due to limited irrigation water supply.

Distribution and Extent

The Daegog soils are of small extent but they occur in many small areas in local valleys associated with residual granite west part of the country and to less extent in scattered areas throughout the granitic areas of the country.

Table E 8 Continued (11)

(SANGJU SERIES)

Profile Description

Ap -- 0 to 10 cm. Pale brown (10YR 6/3) dry, dark yellowish brown (10YR 4/4) fine gravelly sandy loam; weak fine and medium granular structure; friable, slightly sticky and nonplastic; many very fine to fine discontinuous random inped tubular pores; common white mica flakes; about 20 percent fine unweathered angular quartz gravel; common fine living soybean roots; abrupt smooth boundary.

A1 -- 10 to 20 cm. Dark yellowish brown (10YR 4/4) fine gravelly coarse sandy loam; weak fine medium and some coarse granular structure; friable, slightly sticky and nonplastic; common very fine to fine discontinuous inped closed tubular pores; quartz gravel as above; mica as above; common very fine to fine living and dead roots; gradual smooth boundary.

B -- 20 to 60 cm. Dark yellowish brown (10YR 3/4) fine gravelly coarse sandy loam; weak fine medium and coarse granular and some weak subangular blocky structure; slightly firm, slightly sticky and nonplastic; less than 10 percent quartz gravel as above; common medium exped and random tubular pores; few very fine dead grass roots; clear smooth boundary.

C1 -- 60 to 75 cm. Dark yellowish brown (10YR 4/4) loamy coarse sand; weak granular structure; loose, nonsticky and nonplastic; few quartz gravel as above; less pores than above; less roots than above; clear smooth boundary.

C2 -- 75 to 110 cm. Dark brown (10YR 3/3) fine gravelly coarse sandy loam; structureless (massive); slightly firm, slightly sticky and nonplastic; common fine and medium discontinuous exped tubular pores; roots as above; about 10 percent fine gravel as above; clear smooth boundary.

C3 -- 110 to 150 cm. Light yellowish brown (10YR 6/4) fine gravelly loam; structureless (massive); slightly firm, slightly sticky and nonplastic; fine gravel as above and few angular cobbles; few medium discontinuous inped random tubular pores; no roots.

Range in Characteristics

Depth of solum ranges from 50 to 100 cm. Depth to saprolite is about 200 cm and depth to hard rock is more than 3 meters. Reaction is very strongly to strongly acid in Ap horizons except where limed and medium to slightly acid in B and C horizons increasing slightly with depth. About 10 to 35 percent fine angular quartz gravel is

throughout the soil. Base saturation is more than 60 percent throughout the soil though it appears from limited data, to very considerably. Ap horizons are 15 to 25 cm thick dark yellowish brown, brown to dark brown, strong brown or yellowish brown fine gravelly sandy loam, fine sandy loam, loam, loamy sand or coarse sandy loam. Cambic B horizons are dark yellowish brown, yellowish brown, brownish yellow, light yellowish brown or strong brown fine gravelly sandy loam, loam, fine sandy loam or coarse sandy loam. B horizons hues are chiefly 10YR. C horizons are weakly stratified dark yellowish brown, brown, yellowish brown or brownish yellow fine gravelly loamy sand, loamy coarse sand, coarse sandy loam, sandy loam or loam. Buried soils may underlie the solum.

Setting

The Sangju soils occur on gently sloping to sloping undissected or slightly dissected local alluvial-colluvial footslope and alluvial fan positions and are formed in weakly stratified materials washed from coarse textured granitic soils. Slopes range from 2 to 30 percent and 2 to 7 percent slopes are dominant.

Drainage and Permeability

Well drained. Permeability is probably moderately rapid and runoff is medium depending on slope gradient. Depth to the water table is more than 200 cm.

Use and Vegetation

Most of the Sangju soils are used for barley, soybean, sesame, red pepper, mulberry, tobacco and similar upland crops. Some areas produce persimmon, chestnut, jujube, grape and apple.

Distribution and Extent

The Sangju soils are of moderate extent and are distributed in the southern part of the country where coarse textured granitic soils occur.

Table E 8 Continued (13)

(SEOGTO SERIES)

Profile Description

Ap -- 0 to 10 cm. Brown to dark brown (10YR 4/3) gravelly silt loam; moderate fine and medium granular structure; friable, slightly sticky and slightly plastic; approximately 15 to 35 percent unweathered angular andesite, porphyry, gravel and cobbles; common fine and medium discontinuous random interstictial pores; common fine roots; gradual smooth boundary.

B1 -- 10 to 19 cm. Yellowish brown to brown (10YR 5/3.5) very gravelly silty clay loam; weak fine to medium subangular blocky and moderate fine and medium granular structure; friable, sticky and plastic; apporximately 35 to 50 percent gravel and cobbles as above; common fine to medium discontinuous random inped interstitial pores; few worm casts; few fine roots; clear smooth boundary.

B2 -- 19 to 34 cm. Yellowish brown (10YR 5/4) very gravelly to cobbly silty clay loam; weak fine to medium subangular blocky and some granular structure; friable, sticky and plastic; gravel and cobbles as above; few angular stones; few fine and medium discontinuous rendom inped tubular pores; few fine roots; clear smooth boundary.

B3 -- 34 to 52 cm. Yellowish brown (10YR 5/6) very gravelly to cobbly silty clay loam; weak fine and medium subangular blocky and moderate medium granular structure; friable, sticky and plastic; gravel, cobbles and stones as above; few fine discontinuous random inped interstitial pores; few fine roots; clear smooth boundary.

C -- 52 to 80 cm. Mottled brown to dark brown (7.5YR 4/2), pale brown (10YR 6/3) and very dark brown (10YR 2/2) very gravelly cobbly and stony silty clay loam; crushed color yellowish brown (10YR 5/6); structureless (massive); slightly firm, slightly sticky and slightly plastic; few fine discontinuous inped pores; approximately 80 percent coarse fragments.

Range in Characteristics

Solum thickness ranges from 50 to 100 cm and depth to hard rock is more than 2 meters. Though the base saturation of the solum is variable, it is mainly more than 60 percent and increases somewhat below 125 cm. Reaction is strongly to medium acid. These soils contain between 35 to 90 percent gravel, cobbles and stones throughout the profile, which generally increase with depth. The control section contains between 18 to 35 percent clay. Ap or A1 horizons are 15 to 25 cm thick brown, dark brown or dark yellowish brown gravelly, cobbly

or stony silt loam or light silty clay loam. Cambic B horizons are yellowish brown, dark yellowish brown, light yellowish brown, brownish yellow or light brown mostly very gravelly, very cobbly or very stony light silty clay loam, silt loam, loam or light clay loam. C horizons are yellowish brown, browhish yellow or brown very gravelly, very cobbly, very stony or bouldery stratified silt loam or loam.

Setting

The Seogto soils are formed in strongly sloping to steep stony mountain colluvium in narrow valleys and footslopes in soil materials derived dominantly from weathered acidic crystalline rocks. Dominent slopes are 15 to 30 percent and the range is from 7 to 60 percent.

Drainage and Permeability

Well drained. Permeability is moderate and runoff is moderately rapid to rapid depending on the slope gradient.

Use and Vegetation

About half of these soils are used for corn, soybean, tobacco, Indian millet, red bean, red pepper and similar non-irrigated crops. The remainder grows forest, wild grass and wild scrub.

Distribution and Extent

The Seogto soils are of moderate extent and are distributed in steep narrow mountain valleys in the acidic crystalline areas throughout the country.

(SAMGAG SERIES)

Profile Description

A -- 0 to 12 cm. Very pale brown (10YR 6/4) when moist, sandy loam; moderate very fine and fine granular stracture; friable, nonsticky and nonplastic; common fine yellowish mica; many fine and medium living and dead pine tree, wild grass and shrub roots; gradual smooth boundary; pH 4.5.

B1 -- 12 to 23 cm. Strong brown (7.5YR 5/6) coarse sandy loam; weak coarse and medium subangular blocky structure; slightly sticky and nonplastic; few very fine and fine discontinuous random inped simple tubular pores; mica as above; common fine and medium roots as above; clear smooth boundary; pH 5.0.

B2 -- 23 to 32 cm. Reddish yellow (7.5YR 6/6) fine gravelly coarse sandy loam; weak coarse and medium subangular blocky structure breaking readily to moderate granular; friable, nonsticky and nonplastic; pores as above; mica as above; few fine roots as above; gradual wavy boundary; pH 5.2.

C1 -- 32 to 65 cm. Reddish yellow (7.5YR 6/8) fine gravelly loamy sand; structureless (massive) breaking in hand to moderate granular; firm, nonsticky and nonplastic; mica as above; extermely weathered granite saprolite; diffuse wavy boundary; pH 5.5.

C2 -- 65 to 120 cm. Pale brown (10YR 6/3) as above with common fine and medium faint and distinct reddish yellow and strong brown mottles.

Range in Characteristics

Solum thickness is generally less than 50 cm and ranges from about 30 to 75 cm. Depth to hard rock is more than 2 meters generally ranging from 5 to 10 meters or more. Base saturation is commonly medium but the range includes low. Reaction is strongly to medium acid. Fine angular quartz gravel may occur throughout the soil. Mica commonly occurs. Generally bedrock outcrops do not occur; however, in some geologic formations detached boulders and rock outcrops are present. A horizons are generally absent but may be 5 to 15 cm thick brown to dark brown where eroded dark yellowish brown, yellowish brown or pale brown sandy loam or coarse sandy loam. Cambic B horizons 20 to 50 cm thick are reddish yellow, light brown, strong brown, brown or yellowish brown in hues 10YR or 7.5YR sandy loam, coarse sandy loam or light loam with less than 20 percent fine quartz gravel and weak blocky structure. C horizons are dominantly pale brown, light brown or light yellowish brown sandy loam, coarse sandy loam, loamy coarse sand or coarse loam very thick and strongly weathered residual granitic saprolite. Occasional loose boulders may be in this horizon. The boundary of C horizon over bedrock is very gradual, wavy or irregular.

Setting

The Samgag soils occur on hills, low mountatins and the lower parts of some high mountains chiefly in areas of granitic geology and very thick saprolite, developed below old and very old base levels. Slopes range from 7 to 100 percent or more, but 30 to 60 percent slopes are dominant.

Drainage and Permeability

Somewhat excessively drained. Permeability is moderately rapid. When the soil is saturated, the runoff is rapid or very rapid depending on the slope.

Use and Vegetation

Most these soils grow poor pine forest. Some samll areas are cultivated for barley, soybean, potato, sweet potato, red peper, tobacco, melon, sesame and similar non-irrigated crops.

Distribution and Extent

The Samgag soils are of large extent and are distributed throughout the country in hilly areas over deeply weathered granite and granite gneiss parent materials.

Table E 9 CORRELATION BETWEEN TYPE OF PADDY FIELD AND SOIL ASSOCIATION

	Type of Paddy Field	Soil Association
1.	Ordinary paddy field	Fma, Apa, Rxa
2.	Poorly drained paddy field	Fmd, Apd
3.	Sandy paddy field	Fmb, Afb, Apc, Ana, Anc
4.	Unripe paddy field	Anb
5.	Saline paddy field	Fmc, Fmg
6.	Acid sulphate paddy field	Fmk

Source ; Ref. E 12

Table E 10 PROPORTIONAL EXTENT OF TYPE OF PADDY FIELD IN HAN RIVER BASIN

Unit : %

Sub-Basin Code No.	Paddy Field				
	Poorly				Saline & Acid Sulphate
	Ordinary	Drained	Sandy	Unripe	
01(1)	68.8	1.8	24.3	2.9	2.2
01(2)	58.3	1.70	23.5	15.9	0.6
02	45.9	0	27.4	26.7	-
03(1)	76.9	-	17.9	5.2	-
03(2)	66.4	0.1	20.9	12.6	-
04	19.6	-	37.7	42.7	-
05	44.4	0	28.7	26.9	-
06	29.9	0.9	35.7	33.5	-
07	19.4	0.1	43.2	37.3	-
08	13.0	-	40.5	46.5	-
09	6.0	-	48.5	45.5	-
10	8.5	0.8	41.3	49.1	0.3
11	35.4	0.3	36.3	28.0	-
12	23.6	-	39.2	37.2	-
13	7.8	-	35.2	57.0	-
14	14.0	-	31.2	54.8	-
15(1)	11.8	-	47.1	41.1	-
15(2)	7.6	-	44.1	48.3	-
16	7.5	-	44.2	48.3	-
Whole basin	36.3	0.4	32.7	30.4	0.2

Table E 11 PROPORTIONAL EXTENT OF TYPE OF PADDY SOILS IN SEOMJIN RIVER BASIN

Unit : %

Sub-Basin Code No.	Paddy Field				
	Poorly				Saline & Acid Sulphate
	Ordinary	Drained	Sandy	Unripe	
01	21.6	4.4	54.7	18.4	0.9
02	27.6	9.4	38.6	24.1	0.3
03	36.6	-	40.2	23.2	-
04	19.9	0.3	43.1	36.7	-
05	15.1	0.9	47.6	36.4	-
Whole basin	23.6	3.5	44.6	28.0	0.3

Source : Refs. E 3 & E 12

Table E 12 PROPORTIONAL EXTENT OF TYPE OF PADDY FIELD IN NAGDONG RIVER BASIN

Unit : %

Sub-Basin Code No.	Paddy Field				
	Poorly				Saline & Acid Sulphate
	Ordinary	Drained	Sandy	Unripe	
01	6.4	0.8	40.1	52.3	0.4
02	20.5	-	29.4	50.1	-
03	7.2	-	25.1	67.7	-
04	14.5	0.2	32.3	53.0	-
05	31.3	0.3	31.3	37.1	-
06(1)	32.6	0.3	40.6	26.5	-
06(2)	27.1	0.7	45.2	27.0	-
06(3)	43.5	0.7	41.4	14.4	-
06(4)	26.7	0.4	44.4	28.5	-
Northern zone	25.1	0.4	37.3	37.2	0
05	30.4	0.6	49.4	19.6	-
06(1)	32.8	0.9	34.9	31.4	-
06(2)	17.1	2.1	45.5	35.3	-
07	29.5	2.0	42.3	26.0	0.2
08	40.3	-	46.7	13.0	-
09	46.8	0.1	43.6	9.5	-
10	19.6	0.5	60.2	19.7	-
11	14.4	0.6	53.5	31.5	-
12	8.8	-	66.5	24.7	-
13	15.9	-	50.1	34.0	-
14	38.7	-	41.6	19.7	-
Central zone	28.3	0.5	47.9	23.3	0
15(1)	16.5	0.9	51.5	31.1	0
15(2)	24.3	-	54.8	20.9	-
16	30.2	0.3	43.2	26.3	-
17	43.4	0.4	45.4	8.3	2.5
18	38.6	0.5	47.5	7.2	6.2
19	23.2	0.3	15.2	11.3	-
Southern zone	30.1	0.4	51.5	16.5	1.5
Whole basin	28.1	0.4	46.5	24.5	0.5

Source : Refs. E 3 & E 12

Table E 13 SUITABILITY/PRODUCTIVITY GRADE OF PADDY SOILS FOR CULTIVATION OF HIGH-YIELDING NEW RICE VARIETIES AND ITS CORRELATION WITH SOIL ASSOCIATION

Grade	Suitability	Productivity (Yield Index)	Environment of Paddy Field	Soil Association
1	Most suitable	100	Ordinary paddy field in fluvio-marine and alluvial plains	Fma, Apa
			Two thirds of ordinary paddy field in narrow valleys	Rxa (2/3)
2	Suitable	95-100	One third of ordinary paddy field in narrow valleys	Rxa (1/3)
3	Suitable	95	Sandy paddy field in fluvio-marine, flood and alluvial plains, and in narrow valleys	Fmb, Afb, Apc, Ana, Anc
4	Suitable	84	Half of unripe paddy field in narrow valleys	Anb, (1/2)
5	Less suitable	75-80	Poorly drained paddy field in fluvio-marine and alluvial plains	Fmd, Apd
6	Less suitable	70-75	Half of unripe paddy field in narrow valleys	Anb (1/2)
7	Less suitable	63	Saline and acid sulphate paddy field in fluvio-marine plains	Fmc, Fmg, Fmk

Source ; Refs. E 3, E 11, E 12 & E 15 to E 17

Table E 14 PROPORTIONAL EXTENT OF SUITABILITY/PRODUCTIVITY GRADE IN HAN RIVER BASIN

Unit : %

Sub-Basin Code No.	Suitability/Productivity Grade 1	2	3	Total 1 to 3	4	5	6	7	Total 5 to 7
01 (1)	58.9	9.8	24.3	93.0	1.5	1.8	1.5	2.2	5.5
01 (2)	48.2	10.0	23.5	81.7	8.0	1.7	8.0	0.6	10.3
02	36.5	9.2	27.5	73.2	13.4	0	13.4	-	13.4
03 (1)	59.4	17.5	17.9	94.8	2.6	-	2.6	-	2.6
03 (2)	52.0	14.4	20.9	87.3	6.3	0.1	6.3	-	6.4
04 1/	14.5	5.1	37.8	57.4	21.3	-	21.3	-	21.3
05	35.1	9.2	28.7	73.0	13.5	0	13.5	-	13.5
06 1/	23.4	6.5	35.6	65.5	16.8	0.9	16.8	-	17.7
07 1/	14.1	5.3	43.1	62.5	18.7	0.1	18.7	-	18.8
08	9.6	3.4	40.4	53.4	23.3	-	23.3	-	23.3
09	4.5	1.5	48.6	54.6	22.7	-	22.7	-	22.7
10 1/	6.5	2.1	41.2	49.8	24.6	0.7	24.6	0.3	25.6
11	27.6	7.8	36.3	71.7	14.0	0.3	14.0	-	14.3
12	17.9	5.7	39.2	62.8	18.6	-	18.6	-	18.6
13	5.8	1.7	35.1	42.6	28.7	-	28.7	-	28.7
14	11.9	2.1	31.2	45.2	27.4	-	27.4	-	27.4
15 (1)	9.1	2.7	47.0	58.8	20.6	-	20.6	-	20.6
15 (2)	5.7	1.8	44.1	51.6	24.2	-	24.2	-	24.2
16 1/	5.8	1.8	44.2	51.8	24.1	-	24.1	-	24.1
Whole 2/	28.8	7.2	32.9	68.9	15.2	0.5	15.2	0.2	15.9

Table E 15 PROPORTIONAL EXTENT OF SUITABILITY/PRODUCTIVITY GRADE IN SEOMJIN RIVER BASIN

Unit : %

Sub-Basin Code No.	Suitability/Productivity Grade 1	2	3	Total 1 to 3	4	5	6	7	Total 5 to 7
01	19.3	2.3	54.7	76.3	9.2	4.4	9.2	0.9	14.5
02 1/	25.6	1.9	38.6	66.1	12.1	9.4	12.1	0.3	21.8
03	26.9	9.7	40.2	76.8	11.6	-	11.6	-	11.6
04	15.6	4.4	42.9	62.9	18.4	0.3	18.4	-	18.7
05	13.4	1.8	47.5	62.7	18.2	0.9	18.2	-	19.1
Whole basin	20.1	3.6	44.6	68.3	14.0	3.5	14.0	0.2	17.7

Remarks ; 1/ : These sub-basins are further divided into two or three portions in the agricultural water use study (ANNEX G).

2/ : Area beyond D.M.Z. is excluded.

Table E 16 PROPORTIONAL EXTENT OF SUITABILITY/PRODUCTIVITY GRADE IN NAGDONG RIVER BASIN

Unit : %

Sub-Basin Code No.	Suitability/Productivity Grade 1	2	3	Total 1 to 3	4	5	6	7	Total 5 to 7
01	4.5	1.9	40.0	46.4	26.2	0.8	26.2	0.4	27.4
02	14.9	5.6	29.5	50.0	25.0	-	25.0	-	25.0
03	6.4	0.7	25.3	32.4	33.8	-	33.8	-	33.8
04	10.9	3.6	32.3	46.8	26.5	0.2	26.5	0	26.7
05	24.4	7.0	31.3	62.7	18.5	0.3	18.5	-	18.8
06 (1)	26.7	5.9	40.5	73.1	13.3	0.3	13.3	-	13.6
06 (2)	22.3	4.9	45.1	72.3	13.5	0.7	13.5	-	14.2
06 (3)	31.4	12.0	41.5	84.9	7.2	0.7	7.2	-	7.9
06 (4)	18.8	8.0	44.2	71.0	14.3	0.4	14.3	-	14.7
Morthern zone	19.1	5.9	37.4	62.4	18.6	0.4	18.6	0	19.0
05	27.1	3.4	49.3	79.8	9.8	0.6	9.8	-	10.4
06 (1)	29.0	3.8	34.9	67.7	15.7	0.9	15.7	-	16.6
06 (2)	15.5	1.6	45.6	62.7	17.6	2.1	17.6	-	19.7
07	25.3	4.2	42.3	71.8	13.0	2.0	13.0	0.2	15.2
08	33.4	7.0	46.6	87.0	6.5	-	6.5	-	6.5
09	41.7	5.1	43.6	90.4	4.8	0	4.8	-	4.8
10	17.3	2.3	60.1	79.7	9.9	0.5	9.9	-	10.4
11	13.0	1.4	53.4	67.8	15.8	0.6	15.8	-	16.4
12	8.5	0.4	66.3	75.2	12.4	-	12.4	-	12.4
13	15.7	0.3	50.0	66.0	17.0	-	17.0	-	17.0
14	36.7	2.1	41.6	80.4	9.8	-	9.8	-	9.8
Central zone	25.2	3.1	47.9	76.2	11.6	0.6	11.6	-	12.2
15 (1)	15.4	1.1	51.3	67.8	15.6	0.9	15.6	0.1	16.6
15 (2)1/	18.5	5.9	54.6	79.0	10.5	-	10.5	-	10.5
16	29.0	1.2	43.1	73.3	13.2	0.3	13.2	-	13.5
17	42.5	0.9	45.3	88.7	4.2	0.4	4.2	2.5	7.1
18	38.0	0.6	47.6	86.2	3.6	0.5	3.6	6.1	10.2
19	22.5	0.7	65.1	88.3	5.7	0.3	5.7	-	6.0
Southern zone	28.6	1.5	51.6	81.7	8.2	0.4	8.2	1.5	10.1
Whole basin	24.8	3.3	46.5	74.6	12.2	0.5	12.2	0.5	13.2

Remarks ; 1/ : Same as those in Table E 15

Table E 17 LAND CAPABILITY CLASSIFICATION CRITERIA FOR PADDY SOILS IN KOREA

Land Characteristics	Land Capability Class			
	Class 1	Class 2	Class 3	Class 4
1. Productivity	High	Common	Low	Very low
2. Drainage	Imperfectly drained	Moderately well drained	Imperfectly or poorly to very poorly drained	Moderately well drained
3. Soil texture	Clayey to clay loamy	Clayey to clay loamy	Clay loamy to sandy loamy	Sandy loamy to sandy
4. Effective soil depth (cm)	More than 100	100 to 50	50 to 20	Less than 20
5. Slope (%)	0 to 2	2 to 7	7 to 15	15 to 30
6. Salinity (m mhos/cm)	Less than 4	e to 8	8 to 16	More than 16

Note; If slope exceeds 30 %, soils are classified as Class 5.
Source; Ref. E 5

Table E 18 LAND CAPABILITY CLASSIFICATION CRITERIA FOR UPLAND SOILS IN KOREA

Land Characteristics	Land Capability Class			
	Class 1	Class 2	Class 3	Class 4
1. Productivity	High	Common	Low	Very low
2. Topography	Plain	Valley	Rolling	Hilly
3. Drainage	Well drained	Well to moderately well drained	Moderately well drained	Excessively to somewhat excessively drained
4. Soil texture	Loamy	Sandy loamy	Sandy loamy or clayey	Gravelly
5. Slope (%)	0 to 2	2 to 7	7 to 15	15 to 30
6. Effective soil depth (cm)	Deep More than 100	Common 100 to 50	Shallow 50 to 20	Very shallow Less than 20
7. Stoniness (%)	None Less than 10	Common 10 to 35	Common 10 to 35	Many More than 35

Note; If slope exceeds 30 %, soils are classified as Class 5.
Source; Ref. E 5

Table E 19 LAND CAPABILITY CLASSIFICATION CRITERIA FOR ORCHARD SOILS IN KOREA

Land Characteristics	Land Capability Class			
	Class 1	Class 2	Class 3	Class 4
1. Productivity	High	Common	Low	Very low
2. Drainage	Well drained	Moderately well drained	Well to moderately well drained	Imperfectly drained
3. Soil texture	Loamy to sandy loamy	Loamy to sandy loamy or clayey	Clayey or gravelly	Sandy, gravelly sandy or gravelly
4. Slope (%)	Less than 7	7 to 15	15 to 30	30 to 60
5. Effective soil depth	Common	Shallow	Very shallow	Very shallow
6. Stoniness	Few	Common	Many	Very many

Note; If slope exceeds 60 %, soils are classified as Class 5.
Source; Ref. E 5

Table E 20 LAND CAPABILITY CLASSIFICATION CRITERIA FOR INTENSIVE AND EXTENSIVE GRASS LAND IN KOREA

Land Characteristics	Land Capability Class			
	Class 1	Class 2	Class 3	Class 4
1. Productivity	High	Common	Low	Very low
2. Drainage	Well drained	Well to moderately well drained	Imperfectly	Imperfectly
3. Soil texture	Loamy to sandy loamy	Loamy to sandy loamy or gravelly, clayey, sandy	Loamy to sandy loamy or gravelly, clayey, sandy	Loamy to sandy loamy or gravelly, clayey
4. Slope (%)	Less than 15	15 to 30	30 to 60	60 to 100
5. Effective soil depth	Shallow	Very shallow	Very shallow	Very shallow
6. Stoniness	Few	Common	Many	Very many

Note; If bedrocks occur nearly at the ground surface, soils are classified as Class 5.
Source; Ref. E 5

Table E 21 LAND CAPABILITY CLASSIFICATION CRITERIA FOR FOREST SOILS IN KOREA

Land Characteristics	Land Capability Class			
	Class 1	Class 2	Class 3	Class 4
1. Productivity	High	Common	Low	Very low
2. Drainage	Well drained	Well to moderately well drained	Well to moderately well drained	Imperfectly drained
3. Soil texture	Loamy to sandy loamy	Loamy to sandy loamy or gravelly, clayey	Loamy to sandy loamy or gravelly, clayey, sandy	Loamy to sandy loamy or gravelly
4. Slope (%)	Less than 15	15 to 30	30 to 60	60 ro 100
5. Effective soil depth	Shallow	Very shallow	Very shallow	Very shallow
6. Stoniness	Few	Common	Many	Very many

Note; If bedrocks occur nearly at the ground surface, soils are classified as Class 5.
Source; Ref. E 5

Table E 22 CLASSIFICATION CRITERIA FOR RECOMMENDED LAND USE PATTERN IN KOREA

Recommended Land Use Pattern	Classification Criteria
1. Paddy field	Soils having drainage classes of moderately well, imperfectly and poorly to very poorly drained.
2. Upland	Soils extending over less than 15 percent slopes and with clay loamy texture and with drainage classes of well drained and excessively to somewhat excessively. Except for soils having gravel and cobble in A horizons.
3. Paddy field and upland	Among soils with drainage class of moderately well drained soils without hard pan and grayish A horizons.
4. Orchard and mulberry	Soils extending over 15 to 30 percent slopes and with clay loamy texture and with drainage classes of moderately well, well and excessively to somewhat excessively drained. Except for soils having gravel and cobble in A horizons.
5. Intensive grass land	Soils extending over 15 to 30 percent slopes and with clayey texture and with drainage class of well drained.
6. Extensive grass land	Soils extending over 30 to 60 percent slopes and with clayey and clay loamy texture and with drainage class of well drained.
7. Forest	Soils extending over steep slopes such as 60 to 100 percent and having common effective soil depth.
8. Erosion control forest	Soils seriously eroded without any relation to topography, slope and drainage.
9. Nonarable land	Soils without any agricultural utility.

Source; Ref. E 5

Table E 23 LAND CAPABILITY EVALUATION AND RECOMMENDED LAND USE PATTERN OF REPRESENTATIVE SOIL SERIES EXTENDED OVER FARM LANDS

Name of Soil Series and Soil Phase	Land Capability Class					Recommended Land Use Pattern
	Paddy Field	Upland	Orchard	Grass Land	Forest	
1. Gimje series						
Gi; Silt loam, 0 to 2 percent slopes	1	4w	4w	4w	4w	Paddy field
Gj; Silty clay loam, 0 to 2 percent slopes	1	4w	4w	4w	4w	Paddy field
2. Jeonbug series						
Jb; Silt loam, 0 to 2 percent slopes	1	3w	4w	3w	4w	Paddy field
3. Mangyeong series						
Ma; Sandy loam, 0 to 2 percent slopes	3s	3w	4w	3w	4w	Paddy field
Mg; Silt loam, 0 to 2 percent slopes	3s	3w	4w	3w	4w	Paddy field
4. Pyeongtaeg series						
Pt; Silt loam, 0 to 2 percent slopes	1	3w	4w	3w	4w	Paddy field
5. Sinheung series						
Sn; Loam, 0 to 2 percent slopes	1	3w	4w	3w	4w	Paddy field
6. Hamchang series						
Ha; Sandy loam, 0 to 2 percent slopes	3w	5	5	5	5	Paddy field
Hh; Silt loam, 0 to 2 percent slopes	3w	5	5	5	5	Paddy field
7. Sindab series						
Sn; Sandy loam, 0 to 2 percent slopes	4w	5	5	5	5	Paddy field
SnB; Sandy loam, 2 to 7 percent slopes	4w	5	5	5	5	Paddy field
8. Honam series						
Hn; Silty clay loam, 0 to 2 percent slopes	1	4w	4w	4w	4w	Paddy field
9. Hwadong series						
Hj; Silt loam, 0 to 2 percent slopes	2u	2c	3c	2c	2c	Paddy field

Source ; Ref. E 5

Table E 23 Continued (2)

Name of Soil Series and Soil Phase	Land Capability Class: Paddy Field	Upland	Orchard	Grass Land	Forest	Recommended Land Use Pattern
HjB; Silt loam, 2 to 7 percent slopes	2u	2c	3c	2c	2c	Paddy field
Hd; Silty clay loam, 0 to 2 percent slopes	2u	2c	3c	2c	2c	Paddy field
HdB; Silty clay loam, 2 to 7 percent slopes	2u	2c	3c	2c	2c	Paddy field
HaC; Silty clay loam, 7 to 15 percent slopes	3p	3p	3c	2c	2c	Paddy field
10. Sacheon series						
ScB; Sandy loam, 2 to 7 percent slopes	3s	3w	4w	4w	4w	Paddy field
ScC; Sandy loam, 7 to 15 percent slopes	4p	4w	4w	4w	4w	Paddy field
ScD; Sandy loam, 15 to 30 percent slopes	5	5	5	4w	4w	Intensive grass land
SfB; Loam, 2 to 7 percent slopes	3s	3w	4w	4w	4w	Paddy field
SfC; Loam, 7 to 15 percent slopes	4p	4w	4w	4w	4w	Paddy field
11. Jisan series						
Ji; Loam, 0 to 2 percent slopes	1	3w	4w	3w	4w	Paddy field
JiB; Loam, 2 to 7 percent slopes	2p	3w	4w	3w	4w	Paddy field
JiC; Loam, 7 to 15 percent slopes	3p	4w	4w	3w	4w	Paddy field
JiD; Loam, 15 to 30 percent slopes	4e	5	5	3w	4w	Paddy field
12. Ogcheon series						
Oc; Loam, 0 to 2 percent slopes	2w	5	5	5	5	Paddy field
OcB; Loam, 2 to 7 percent slopes	2w	5	5	5	5	Paddy field
13. Bonryang series						
Bo; Sandy loam, 0 to 2 percent slopes	4s	1	1	1	1	Upland
14. Nagdong series						
Nd; Loamy fine sand, 0 to 2 percent slopes	5	4s	4s	3s	3s	Upland
Nn; Fine sandy loam, 0 to 2 percent slopes	5	4s	4s	3s	3s	Upland

Table E 23 Continued (3)

Name of Soil Series and Soil Phase	Land Capability Class: Paddy Field	Upland	Orchard	Grass Land	Forest	Recommended Land Use Pattern
15. Ihyeon series						
Ih; Silt loam, 0 to 2 percent slopes	3u	1	1	1	1	Upland
16. Bancheon series						
BcB; Silty clay loam, 2 to 7 percent slopes	3u	2c	2c	2c	2c	Upland
BcC2; Silty clay loam, erosion, 7 to 15 percent slopes	4p	3p	3c	2c	2c	Upland
BcD2; Silty clay loam, erosion, 15 to 30 percent slopes	5	4p	4c	2c	2c	Intensive gress land
17. Hwangryong series						
Hl; Gravelly loamy sand, 0 to 2 percent slopes	5	4g	4g	4g	4g	Upland
Hr; Gravelly sandy loam, 0 to 2 percent slopes	5	4g	4g	4g	4g	Upland
Hy; Loamy sand, 0 to 2 percent slopes	5	4g	4g	4g	4g	Upland
Hk; Sandy loam, 0 to 2 percent slopes	5	4g	4g	4g	4g	Upland
HN; Shallow bedrock, sandy loam, 0 to 2 percent slopes	5	5	5	4g	4g	Extensive Grass land
18. Pungcheong series						
Pz; Sandy loam, 0 to 2 percent slopes	4g	2g	2g	2g	2g	Upland
PzB; Sandy loam, 2 to 7 percent slopes	4g	2g	2g	2g	2g	Upland
PzC; Sandy loam, 7 to 15 percent slopes	5	3g	3g	2g	2g	Upland
Px; Gravelly sandy loam, 0 to 2 percent slopes	4g	2g	2g	2g	2g	Upland
PxB; Gravelly sandy loam, 2 to 7 percent slopes	4g	2g	2g	2g	2g	Upland
Pu; Gravelly loam, 0 to 2 percent slopes	4g	2g	2g	2g	2g	Upland
PuB; Gravelly loam, 2 to 7 percent slopes	4g	2g	2g	2g	2g	Upland
PuC; Gravelly loam, 7 to 15 percent slopes	5	3g	3g	2g	2g	Upland
19. Daegog series						
DLB; Sandy loam, 2 to 7 percent slopes	2u	2w	2w	2w	2w	Upland or paddy field
DkB; Loam, 2 to 7 percent slopes	2u	2w	2w	2w	2w	Upland or paddy field

Table E 23 Continued (4)

Name of Soil Series and Soil Phase	Land Capability Class					Recommended Land Use Pattern
	Paddy Field	Upland	Orchard	Grass Land	Forest	
DkC; Loam, 7 to 15 percent slopes	3p	3p	3w	2w	2w	Upland or Paddy field
20. Sangju series						
SAB; Sandy loam, 2 to 7 percent slopes	4s	2p	1	1	1	Upland
SAC; Sandy loam, 7 to 15 percent slopes	4p	3p	2p	1	1	Upland
SuB; Gravelly sandy loam, 2 to 7 percent slopes	4s	2p	1	1	1	Upland
SuC; Gravelly sandy loam, 7 to 15 percent slopes	4p	3p	2p	1	1	Upland
SuD; Gravelly sandy loam, 15 to 30 percent slopes	5	4p	3p	2p	2p	Orchard
21. Seogto series						
StC; Gravelly loam, 7 to 15 percent slopes	5	3g	3g	2g	2g	Upland
StD; Gravelly loam, 15 to 30 percent slopes	5	4g	4e	3g	2g	Extensive Grass land
StE; Gravelly loam, 30 to 60 percent slopes	5	5	5	4g	4g	Extensive grass land
SsC; Shallow hard pan, loam, 7 to 15 percent slopes	5	5	4p	3g	2g	Extensive grass land
SsD; Shallow hard pan, loam, 15 to 30 percent slopes	5	5	5	4g	2g	Extensive grass land
SsE; Shallow hard pan, loam, 30 to 60 percent slopes	5	5	5	5	3g	Forest
SbC; Shallow bedrock, loam, 7 to 15 percent slopes	5	5	4g	3g	2g	Extensive Grass land
SbD; Shallow bedrock, loam, 15 to 30 percent slopes	5	5	5	4g	2g	Extensive Grass land
SbE; Shallow bedrock, loam, 30 to 60 percent slopes	5	5	5	5	3g	Forest
22. Samgag series						
SgC; Sandy loam, 7 to 15 percent slopes	4p	3p	2p	1	1	Upland
SgC2; Sandy loam, erosion, 7 to 15 percent slopes	4p	3p	2p	1	1	Upland

Table E 23 Continued (5)

Name of Soil Series and Soil Phase	Land Capability Class					Recommended Land Use Pattern
	Paddy Field	Upland	Orchard	Grass Land	Forest	
SgC3; Sandy loam, severely eroded, 15 to 30 percent slopes	5	5	4p	3p	2p	Extensive grass land
SgD; Sandy loam, 15 to 30 percent slopes	5	4p	3p	2p	2p	Orchard
SgD2; Sandy loam, eroded, 15 to 30 percent slopes	5	4p	3p	2p	2p	Orchard
SgD3; Sandy loam, severely eroded, 15 to 30 percent slopes	5	5	4p	3p	3p	Extensive grass land
SgD4; Very shallow soils, sandy loam, very severely eroded, 15 to 30 percent slopes	5	5	5	5	4e	Erosion control forest
SgE2; Sandy loam, eroded, 30 to 60 percent slopes	5	5	4p	3p	3p	Extensive grass land
SgE3; Sandy loam, severely eroded, 30 to 60 percent slopes	5	5	5	4p	4p	Forest
SgE4; Very shallow soils, sandy loam, very severely eroded, 30 to 60 percent slopes	5	5	5	5	4e	Erosion control forest
SgF2; Sandy loam, eroded, 60 to 100 percent slopes	5	5	5	4p	4p	Forest
SmD2; Rock, eroded, 15 to 30 percent slopes	5	5	4p	3p	3p	Extensive grass land
SmD3; Rock, severely eroded, 15 to 30 percent slopes	5	5	5	4p	3p	Forest
SmD4; Rocky soils, very severely eroded, 15 to 30 percent slopes	5	5	5	5	4e	Erosion control forest
SmE2; Rocky sandy loam, eroded, 30 to 60 percent slopes	5	5	5	4p	3p	Extensive grass land
SmE3; Rocky, sandy loam, severely eroded, 30 to 60 percent slopes	5	5	5	5	4p	Forest
SmE4; Rocky soils, very severely eroded, 30 to 60 percent slopes	5	5	5	5	4e	Erosion control forest

Table E 23 Continued (6)

Name of Soil Series and Soil Phase	Land Capability Class					Recommended Land Use Pattern
	Paddy Field	Upland	Orchard	Grass Land	Forest	
SmF2; Rocky, sandy loam, eroded, 60 to 100 percent slopes	5	5	5	5	4p	Forest
SmF3; Rock, severely eroded, 60 to 100 percent slopes	5	5	5	5	5	Unused land
SvD4; Very rocky soils, very severely eroded, 15 to 30 percent slopes	5	5	5	5	5	Unused land
SvE2; Very rocky, sandy loam, eroded, 30 to 60 percent slopes	5	5	5	5	5	Unused land
SvE3; Very rocky, sandy loam, severely eroded, 30 to 60 percent slopes	5	5	5	5	5	Unused land
SvE4; Rocky soils, very severely eroded, 30 to 60 percent slopes	5	5	5	5	5	Unused land
SvF2; Very eroded, sandy loam, eroded, 60 to 100 percent slopes	5	5	5	5	5	Unused land
SvF3; Very eroded, sandy loam, severely eroded, 6o to 100 percent slopes	5	5	5	5	5	Unused land

Table E 24 AREA EXTENT OF RECOMMENDED LAND USE PATTERN IN HAN RIVER BASIN

Unit: ha

Land Use Pattern	Sub-Basin Code No. 01(1)	01(2)	02	03(1)	03(2)	04/1
1. Paddy field	20,710	21,360	14,840	13,400	14,550	11,450
2. Upland	9,640	23,920	14,580	11,610	9,680	12,070
3. Paddy/Upland	2,620	3,090	790	800	610	20
4. Orchard	4,080	10,120	5,500	7,280	4,870	2,900
5. Grass land	1,930	7,610	6,440	7,210	4,740	620
5.1 Intensive	190	170	180	800	120	130
5.2 Extensive	1,740	7,440	6,260	6,410	4,620	490
6. Forest	20,660	34,990	74,580	5,400	22,840	107,210
7. Erosion control	890	7,680	2,890	490	1,560	6,090
8. Others/2	11,270	53,030	16,080	4,910	6,150	5,240
Total 1 to 8	71,800	161,800	135,700	51,100	65,000	145,600

Land Use Pattern	Sub-Basin Code No. 05	06/1	07/1	08	09	10/1
1. Paddy	12,040	11,540	9,730	6,240	570	1,810
2. Upland	6,770	13,640	20,750	14,690	6,110	14,890
3. Paddy/Upland	100	-	-	-	-	-
4. Orchard	3,390	6,830	3,810	2,730	440	1,460
5. Grass land	3,280	1,500	1,200	580	260	450
5.1 Intensive	150	220	200	120	30	80
5.2 Extensive	3,130	1,280	1,000	460	230	370
6. Forest	59,200	89,380	190,520	135,230	62,210	141,270
7. Erosion control	2,930	6,140	15,150	14,500	1,930	10,460
8. Others/2	6,290	5,770	4,040	2,930	380	460
Total 1 to 8	94,000	134,800	245,200	176,900	71,900	170,800

Source: Refs. E 3 to E 5

Remarks; /1: These sub-basins are further divided into two or three portions for the agricultural water use study in ANNEX G.

/2: Including water reservoir, cities, villages, etc.

/3: Sub-basin HN-17 locating beyond D.M.Z line is excluded.

Table E 24 Continued (2)

Unit: ha

Land Use Pattern	Sub-Basin Code No. 11	12	13	14	15(1)	15(2)
1. Paddy	3,690	3,090	6,250	3,970	2,500	970
2. Upland	4,440	4,820	7,280	7,670	2,270	2,900
3. Paddy/Upland	90	30	-	40	-	-
4. Orchard	1,900	1,590	2,040	2,970	4,650	2,300
5. Grass land	1,210	1,470	540	860	730	810
5.1 Intensive	30	20	50	20	50	30
5.2 Extensive	1,180	1,450	490	840	680	780
6. Forest	46,860	60,840	119,490	78,100	138,640	86,790
7. Erosion control	3,630	5,010	9,310	4,820	16,310	10,180
8. Others /2	1,980	1,150	2,390	4,970	900	350
Total 1 to 8	63,800	78,000	147,300	103,400	166,000	104,300

Land Use Pattern	Sub-Basin Code No. 16 /1	Whole Basin /3
1. Paddy field	2,390	161,100
2. Upland	2,530	190,260
3. Paddy/Upland	-	8,190
4. Orchard	2,130	70,990
5. Grass land	620	42,060
5.1 Intensive	10	2,600
5.2 Extensive	610	39,460
6. Forest	90,340	1,564,550
7. Erosion control	3,000	122,970
8. Others /2	1,990	130,280
Total 1 to 8	103,000	2,290,400

Table E 25 AREA EXTENT OF RECOMMENDED LAND USE PATTERN IN NAGDONG RIVER BASIN

Unit: ha

Land Use Pattern	Sub-Basin Code No. 01	02	03	04	05	06(1)
1. Paddy field	1,500	2,090	4,310	2,750	13,170	10,300
2. Upland	6,000	5,890	9,180	4,870	17,280	7,940
3. Paddy/Upland	20	-	50	10	30	-
4. Orchard	500	450	1,920	690	5,450	2,760
5. Grass land	1,700	18,360	2,750	13,050	19,150	12,120
5.1 Intensive	120	490	110	290	780	80
5.2 Extensive	1,580	17,870	2,640	12,760	18,370	12,040
6. Forest	89,030	18,490	98,670	32,680	75,010	14,890
7. Erosion control	11,150	960	5,760	5,870	3,490	3,170
8. Others /2	600	1,660	360	480	1,820	1,820
Total 1 to 8	110,500	47,900	123,000	60,400	135,400	53,000

Land Use Pattern	Sub-Basin Code No. 06(2)	06(3)	06(4)	Northern-total
1. Paddy field	9,230	11,110	13,460	67,920
2. Upland	7,730	6,790	9,700	75,380
3. Paddy/Upland	30	20	20	180
4. Orchard	1,230	5,040	2,920	20,960
5. Grass land	6,350	14,940	8,400	96,820
5.1 Intensive	130	700	150	2,850
5.2 Extensive	6,220	14,240	8,250	93,970
6. Forest	49,880	25,060	63,000	466,710
7. Erosion control	6,460	8,780	11,810	57,450
8. Others /2	1,690	1,560	1,690	11,680
Total 1 to 8	82,600	73,300	111,000	797,100

Source: Refs. E 3 to E 5

Remarks; /1: This sub-basin is further divided into two portions for the agricultural water use study in ANNEX G.

/2: Including water reservoir, cities, villages, etc.

Table E 25 Continued (2)

Unit: ha

Land Use Patter	Sub-Basin Code No. 05	06(1)	06(2)	07	08	09
1. Paddy field	14,570	17,070	12,180	710	19,080	8,050
2. Upland	8,150	11,130	5,930	1,620	8,370	3,180
3. Paddy/Upland	-	250	220	120	850	-
4. Orchard	2,980	5,080	2,530	380	8,840	1,900
5. Grass land	4,520	5,520	290	890	6,150	5,070
5.1 Intensive	950	320	120	190	250	610
5.2 Extensive	3,570	5,200	170	700	5,900	4,460
6. Forest	39,450	101,340	63,600	15,560	76,850	21,260
7. Erosion control	1,910	4,780	1,890	970	5,260	7,430
8. Others /2	2,120	1,530	3,260	3,250	5,500	7,510
Total 1 to 8	73,700	146,700	89,900	23,500	130,900	54,400

Land Use Pattern	Sub-Basin Code No. 10	11	12	13	14
1. Paddy field	14,750	8,540	12,470	4,500	12,000
2. Upland	7,530	3,450	3,750	2,690	7,150
3. Paddy/Upland	250	160	-	20	520
4. Orchard	1,820	2,130	3,130	1,870	4,390
5. Grass land	9,890	1,160	570	540	4,970
5.1 Intensive	440	170	100	160	190
5.2 Extensive	9,450	990	470	380	4,780
6. Forest	39,130	55,090	65,370	29,080	46,580
7. Erosion control	2,690	840	4,960	700	3,080
8. Others /2	740	6,730	2,250	700	2,110
Total 1 to 8	76,800	78,100	92,500	40,100	80,800

Table E 25 Continued (3)

Unit: ha

Land Use Pattern	Sub-Basin Code No.				
	Central-total	15(1)	15(2) /1	16	17
1. Paddy	123,920	14,380	11,390	20,110	23,000
2. Upland	62,950	4,330	5,360	10,010	8,350
3. Paddy/Upland	2,390	50	110	210	570
4. Orchard	35,050	2,300	1,100	7,640	4,950
5. Grass land	39,570	2,210	1,980	3,300	9,480
5.1 Intensive	3,500	140	260	220	1,240
5.2 Extensive	36,070	2,070	1,720	3,080	8,240
6. Forest	553,310	94,640	73,240	68,400	38,720
7. Erosion control	34,510	3,320	5,560	5,280	8,890
8. Others /2	35,700	5,370	3,160	3,150	3,740
Total 1 to 8	887,400	126,600	101,900	118,100	97,700

Land Use Pattern	Sub-Basin Code No.			
	18	19	Southern-total	Whole Basin
1. Paddy	19,800	15,500	104,180	296,020
2. Upland	3,520	6,710	38,280	176,610
3. Paddy/Upland	500	100	1,540	4,110
4. Orchard	1,700	2,640	20,330	76,340
5. Grass land	11,560	5,770	34,300	170,690
5.1 Intensive	1,400	1,070	4,330	10,680
5.2 Extensive	10,160	4,700	29,970	160,010
6. Forest	42,340	96,470	413,810	1,433,830
7. Erosion control	8,680	15,620	47,350	139,310
8. Others /2	4,000	1,890	21,310	68,690
Total 1 to 8	92,100	144,700	681,100	2,365,600

Table E 26 AREA EXTENT OF RECOMMENDED LAND USE PATTERN IN SEOMJIN RIVER BASIN

Unit: ha

Land Use Pattern	Sub-Basin Code No. 01	02 /1	03	04	05	Whole Basin
1. Paddy field	11,930	16,880	9,980	18,100	7,170	64,060
2. Upland	5,950	8,340	5,350	9,830	6,550	36,020
3. Paddy/Upland	90	420	250	620	30	1,410
4. Orchard	1,220	1,620	1,670	4,340	1,150	10,000
5. Grass land	1,440	5,390	1,340	2,000	1,340	11,510
5.1 Intensive	270	650	90	340	320	1,670
5.2 Extensive	1,170	4,740	1,250	1,660	1,020	9,840
6. Forest	84,580	95,240	45,690	66,650	56,620	348,780
7. Erosion control	6,000	3,250	1,460	3,160	2,970	16,840
8. Others /2	1,730	790	660	1,130	470	4,780
Total 1 to 8	112,940	131,930	66,400	105,830	76,300	493,400

Source: Refs. E 3 to E 5

Remarks; /1: This sub-basin is further divided into two portions for the agricultural water use study in ANNEX G.

/2: Including water reservoir, cities, villages, etc.

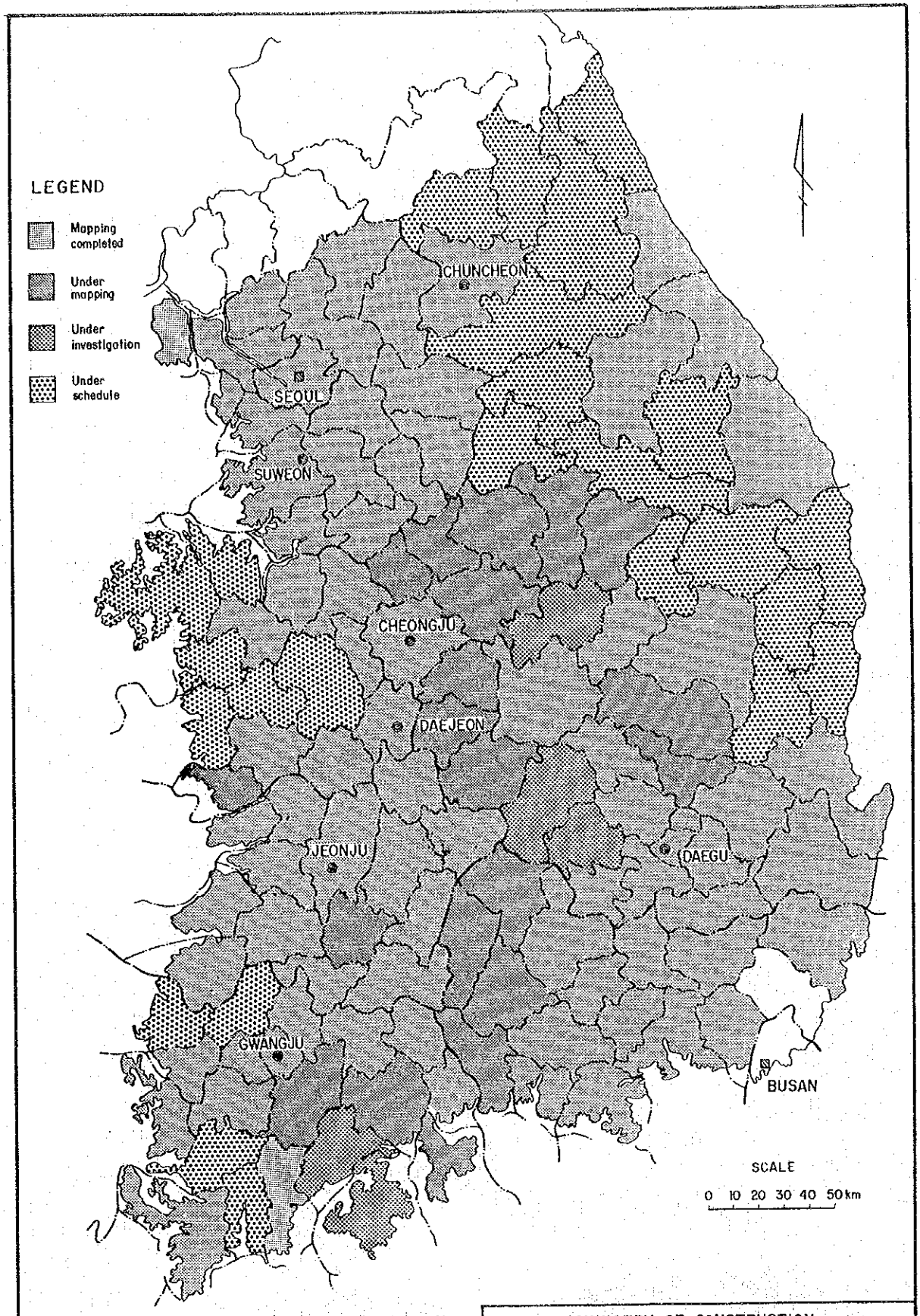

Fig. E 1 Progress of Detailed Soil Survey Works in Korea (As of October 1978)

MINISTRY OF CONSTRUCTION
GOVERNMENT OF THE REPUBLIC OF KOREA
THE LONG-TERM MULTIPURPOSE DAM SCHEMES
PRELIMINARY FEASIBILITY STUDY

JAPAN INTERNATIONAL COOPERATION AGENCY