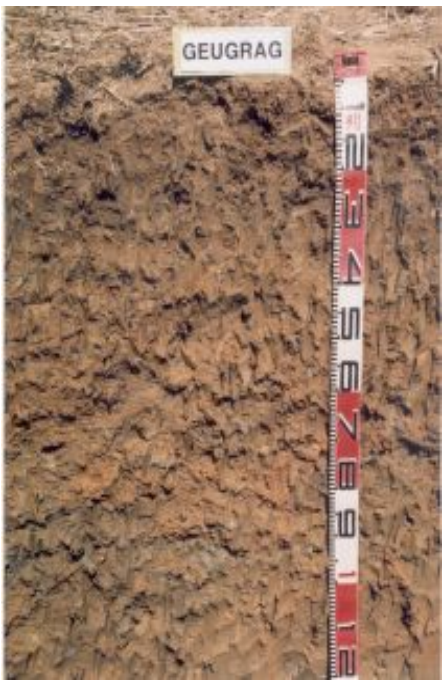
GEUGRAG SERIES

Established Series
Rev. UKT
5 May, 1971

The Geugrag series are members of the fine, mixed, mesic family of Anthraquic Hapludalfs [Hydragric Anthrosols (Eutric Oxyaquic) classified by WRB]. These soils have dark gray silt loam Ap horizons with yellowish red mottles, dark gray clay loam BAg horizons with strong brown mottles, dark yellowish brown silty clay loam Bt1 horizons with light olive brown mottles, yellowish brown clay Bt2 horizons with grayish brown mottles, and gray clay Btg horizons with yellowish brown mottles. They occur on continental river terraces.

Typifying Pedon: Geugrag silt loam-paddy rice (Colors are for moist soil).

Slope: 0-2%
Elevation: 6 m above m.s.l.
Soil moisture regime: Udic
Soil temperature regime: Mesic
Parent material: Old alluvium
Diagnostic features: An occhric epipedon from a depth of 0 to 13 cm and an argillic horizon from a depth of 23 to 140 cm (An anthraquic horizon from a depth of 0 to 23 cm and an argic horizon from a depth of 23 to 140 cm by WRB).
Described by: Song, K. C., S. J. Jung, and D. C. Noh, 29 March, 2006.



Morphological properties of typifying pedon.

Ap - 0 to 13 cm. Dark gray (10YR 4/1) silt loam; common fine to medium distinct yellowish red (5YR 5/6) mottles; structureless, puddled; firm, sticky and plastic; common fine rice roots;

common fine to medium pores; abrupt smooth boundary.

BAg - 13 to 23 cm. Dark gray (2.5Y 4/1) clay loam; common fine to medium prominent strong brown (7.5YR 5/6) mottles; moderate prismatic structure; firm, very sticky and very plastic; common fine rice roots; common fine to medium pores; clear smooth boundary.

Bt1 - 23 to 46 cm. Dark yellowish brown (10YR 4/6) silty clay loam; common fine faint light olive brown (2.5YR 5/4) mottles; moderate coarse prismatic structure; very firm, very sticky and very plastic; thick continuous clay cutans; few fine rice roots; few fine pores; clear smooth boundary.

Bt2 - 44 to 70 cm. Yellowish brown (10YR 5/6) clay; common fine to medium faint grayish brown (2.5YR 5/2) mottles; strong coarse angular blocky structure; very firm, very sticky and very plastic; thick continuous clay cutans; few fine rice roots; common fine to medium pores; clear wavy boundary.

Btg - 70 to 104 cm. Gray (5Y 5/1) clay; common fine to medium prominent yellowish brown (10YR 5/6) mottles; strong angular blocky structure; very firm, very sticky and very plastic; few fine to medium rice roots; common fine to medium pores; clear smooth boundary.

BCtg - 104 to 140 cm. Olive gray (5Y 5/2) clay; common fine to medium prominent light olive brown (2.5Y 5/6) mottles; weak prismatic structure; firm, sticky and plastic; no roots; few fine pores; clear smooth boundary.

Cg – 140 to 180 cm

The typifying pedon has an ochric epipedon from a depth of 0 to 13 cm, an argillic horizon from a depth of 23 to 140 cm, and has a base saturation (by sum of cations) of 35% or more at 125 cm below the upper boundary of the argillic horizon. That can be classified as Alfisol. It has aquic conditions for some time in normal years in one or more horizons within 50 cm of the mineral soil surface, but does not have 50 percent or more redox depletions with chroma of 2 or less within the upper 12.5 cm of the argillic horizon. Therefore it can be classified as Udalf. It meets the requirements of Hapludalf. It has anthraquic condition and keys out as Anthraquic Hapludalf.

Typifying pedon has more than 35% clay at the particle-size control section and has mesic soil temperature regime. Therefore it can be classified as fine, mixed, mesic family of Anthraquic Hapludalf.

Type Location: About 400 meters south-west of the Crossroads between No. 712 and No. 714 road, Wolseong Dong, Gimje city, Jeollabug Do (126^{o} 54' 50.6", 35^{o} 46' 50.7").

Range in Characteristics: These soils ochric epipedons and argillic horizons. Solum thickness ranges from more than 100 cm and the Cg horizon thickness ranges from two to three meters or more. Reaction ranges from strongly to slightly acid, generally increasing slightly with depth. Base saturation is more than 60 percent. Ap horizons are gray, grayish brown, dark grayish, or brown silt loam or silty clay loam with yellowish brown, dark yellowish brown, or strong brown

mottles. Bt horizons are yellowish brown, dark yellowish brown, brown, or dark brown silty clay or silty clay loam with light gray to gray mottles. Btg horizons are gray silty clay loam or clay loam with yellowish brown or dark yellowish brown mottles and usually black or dark brown soft manganese concretions.

Competing Series and Their Differentiae: These are the Chogye, Paju, and Chilgog seires. The Chogye series are on low mountain foot slopes derived from old-colluvial materials. The Paju series occur on low river terraces derived from basaltic materials. The Chilgog series occur on mountain foot slopes derived from acid crystalline rocks and have fine loamy texture class.

Setting: The Geugrag soils occur on level to nearly level slightly dissected low river terraces where dominant slopes range less than 2 percent.

Principal Associated Soils: These soils occur at lower elevations and have more yellow hues than the redder Hwadong and Bancheon soils. They are at higher elevations than the grayer Honam, Sugye, or Hamchang soils.

Drainage and Permeability: The Geugrag soils occupy the worse drained portions of the moderately well drained class. They are very slowly permeable and runoff is slow. The artificially controlled water table fluctuates between 100 and 150 cm during most seasons.

Use and Vegetation: Most areas are used for flooded paddy rice during the summer and about half for non irrigated barley during the winter months.

Distribution and Extent: The Geugrag soils are of small extent and occur in the river terraces mostly in the western and southern parts of Korea.

Series Established: Gwangsan Gu, Gwangju city, 1966. **Revised,** Gimje city, Jeollabug Do, 2006.

Laboratory data sheets of typifying pedon.

Depth (cm)	Horizon	(--- Total ---)			(-- Clay --)		(-- Silt --)		(------- Sand -------)				
		Clay	Silt	Sand	Fine	Coarse	Fine	Coarse	VF	F	M	C	VC
		LT .002	.002 - .05	.05 - 2	LT .0002	LT .002	.002 - .02	.02 - .05	.05 - .10	.10 - .25	.25 - .50	.5 - 1	1 - 2
		- - - - - - - - - - - - Pct of < 2mm (3A1) - - - - - - - - - - - -											
0-13	Ap	26.3	53.2	20.5					4.1	3.1	3.1	6.1	4.1
13-23	BAg	29.3	45.4	25.3					5.0	4.1	4.1	7.1	5.1
23-46	Bt1	32.6	50.2	17.2					3.0	3.0	3.0	5.1	3.0
46-70	Bt2	35.6	47.2	17.2					5.1	4.0	2.0	4.0	2.0
70-104	Btg	30.8	46.8	22.4					6.2	5.1	3.0	5.1	2.0
104-140	BCtg	29.5	39.1	31.4					9.1	7.1	5.1	7.1	3.0
140-180	Cg	18.1	24.8	57.1					7.0	6.0	11.0	20.1	13.0

Depth (cm)	Coarse Fractions(mm) Weight 2-5	5-20	20-75	.1-75	>2mm Wt Pct of Whole Soil	Orgn C 6A1c	Total N 6B3a	Extr P 6S3	Total S 6R3a	(-- Dith -Cit --) Extractable Fe 6C2b	Al 6G7a	Mn 6D2a
	Pct of < 75mm (3B1)					Pct < 2mm		g/kg		Pct of < 2mm		
0-13						1.36						
13-23						0.90						
23-46						0.76						
46-70						0.66						
70-104						0.70						
104-140						0.66						
140-180						0.18						

Depth (cm)	Ratio/Clay CEC 8D1	1500 kPa 8D1	Atterberg Limits LL 4P1	PI 4P	(Bulk Density) Field Moist 4A3a	33 kPa 4A1d	Oven Dry 4A1h	COLE Whole Soil 4D1	(- Water Content -) Field Moist 4B4	10 kPa 4B1c	33 kPa 4B1c	1500 kPa 4B2a	WRD Whole Soil 4C1
			Pct <0.4mm		- - g/cc - -			cm/cm	-- Pct of <2mm --				cm/cm
0-13	0.68				1.39				21.8				
13-23	0.55				1.61				24.6				
23-46	0.55				1.67				22.8				
46-70	0.53				1.57				26.3				
70-104	0.55				1.57				25.7				
104-140	0.57				1.62				23.5				
140-180	0.47												

Depth (cm)	(NH4OAc Extractable Bases) Ca 5B5a 6N2e	Mg 5B5a 6O2d	K 5B5a 6Q2b	Na 5B5a 6P2b	Sum Bases	Acid-ity 6H5a	Extr Al 6G9a	(----- CEC -----) Sum Cats 5A3a	NH4-OAc 5A8b	Bases + Al 5A3b	Al Sat 5G1
	- - - - - - - - - - - - - meq / 100g - - - - - - - - - - - - -										Pct
0-13	5.9	3.8	0.2	0.2	10.2	11.0	1.8	21.2	18.0	12.0	15.0
13-23	7.2	5.2	0.2	0.3	12.8	6.5	0.2	19.3	16.0	13.0	1.5
23-46	8.0	6.3	0.1	0.4	14.9	9.0	0.2	23.9	17.8	15.1	1.3
46-70	7.7	6.3	0.1	0.4	14.5	14.0	0.3	28.5	18.4	14.8	2.0
70-104	7.2	5.9	0.1	0.4	13.6	13.0	0.2	26.6	17.0	13.8	1.4
104-140	6.8	5.6	0.1	0.3	12.8	14.0	0.2	26.8	16.8	13.0	1.5
140-180	4.1	2.9	0	0.2	7.2	11.5	0.1	18.7	8.4	7.3	1.4

Depth (cm)	(Base Sat) Sum 5C3	NH4-OAc 5C1	CO3 as CaCO3 <2mm 6E1g	Res 8E1	Cond 8I	(------ pH ------) NaF 8C1d	KCl	CaCl2 .01M 8C1f	H2O 8C1f	Acid Opt Den 8J	Oxalate Extraction Al 6G12	Fe 6C9a	Si 6V2
	---- Pct ----			ohms/cm	dS/m		1: 1	1: 2	1: 1		- Pct of <2mm -		
0-13	48.1	56.6					3.9	4.7	5.2				
13-23	66.3	80.1					4.6	5.5	6.0				
23-46	62.3	83.6					4.9	6.0	6.5				
46-70	50.9	78.9					4.3	5.5	6.0				
70-104	51.2	80.2					4.6	5.7	6.2				
104-140	47.8	76.3					4.7	5.9	6.4				
140-180	38.5	85.9					4.8	6.0	6.5				