TABLE 3.2 Comparison of the Classification of a Common Cultivated Plant, White Clover (*Trifolium repens*), and a Soil, Miami Series

Plant classification			*Soil classification*	
Phylum	Pterophyta	Increase specificity ↓	Order	Alfisols
Class	Angiospermae		Suborder	Udalfs
Subclass	Dicotyledoneae		Great Group	Hapludalfs
Order	Rosales		Subgroup	Oxyaquic Hapludalfs
Family	Leguminosae		Family	Fine loamy, mixed, mesic, active
Genus	*Trifolium*		Series	Miami
Species	*repens*		Phase[a]	Miami silt loam

[a] Technically not a category in *Soil Taxonomy* but used in field surveying. *Silt loam* refers to the texture of the A horizon.

Name	*Formative element*	*Derivation*	*Pronunciation*	*Major characteristics*
Alfisols	alf	Nonsense symbol	Ped*alf*er	Argillic, natric, or kandic horizon; high to medium base saturation
Andisols	and	Jap. *ando,* blacksoil	*And*esite	From volcanic ejecta, dominated by allophane or Al-humic complexes
Aridisols	id	L. *aridus,* dry	A*rid*	Dry soil, ochric epipedon, sometimes argillic or natric horizon
Entisols	ent	Nonsense symbol	Rec*ent*	Little profile development, ochric epipedon common
Gelisols	el	Gk. *gelid,* very cold	*Jel*ly	Permafrost, often with cryoturbation (frost churning)
Histosols	ist	Gk. *histos,* tissue	*Hist*ology	Peat or bog; >20% organic matter
Inceptisols	ept	L. *inceptum,* beginning	Inc*ept*ion	Embryonic soils with few diagnostic features, ochric or umbric epipedon, cambic horizon
Mollisols	oll	L. *mollis,* soft	M*oll*ify	Mollic epipedon, high base saturation, dark soils, some with argillic or natric horizons
Oxisols	ox	Fr. *oxide,* oxide	O*xi*de	Oxic horizon, no argillic horizon, highly weathered
Spodosols	od	Gk. *spodos,* wood ash	*Pod*zol; odd	Spodic horizon commonly with Fe, Al oxides and humus accumulation
Ultisols	ult	L. *ultimus,* last	*Ult*imate	Argillic or kandic horizon, low base saturation
Vertisols	ert	L. *verto,* turn	In*vert*	High in swelling clays; deep cracks when soil dry

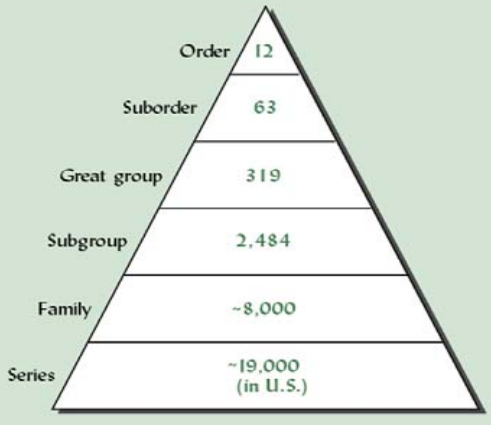


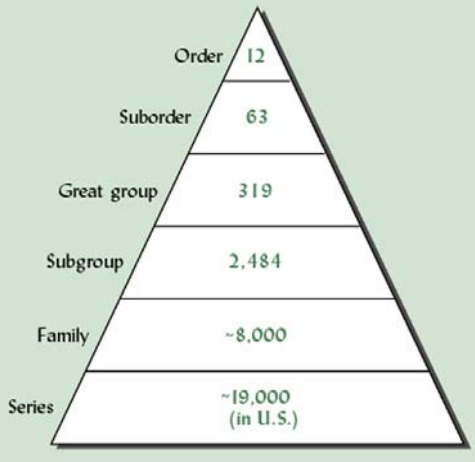
TABLE 3.5 Soil Orders and Suborders in *Soil Taxonomy*

Note that the ending of the suborder name identifies the order in which the soils are found.

Order	*Suborder*	*Order*	*Suborder*	*Order*	*Suborder*
Alfisols	Aqualfs	Andisols	Aquands	Aridisols	Argids
	Cryalfs		Cryands		Calcids
	Udalfs		Torrands		Cambids
	Ustalfs		Udands		Cryids
	Xeralfs		Ustands		Durids
			Vitrands		Gypsids
			Xerands		Salids
Entisols	Aquents	Gelisols	Histels	Histosols	Fibrists
	Arents		Orthels		Folists
	Fluvents		Turbels		Hemists
	Orthents				Saprists
	Psamments				
Inceptisols	Anthrepts	Mollisols	Albolls	Oxisols	Aquox
	Aquepts		Aquolls		Perox
	Cryepts		Cryolls		Torrox
	Udepts		Rendolls		Udox
	Ustepts		Udolls		Ustox
	Xerepts		Ustolls		
			Xerolls		
Spodosols	Aquods	Ultisols	Aquults	Vertisols	Aquerts
	Cryods		Humults		Cryerts
	Humods		Udults		Uderts
	Orthods		Ustults		Usterts
			Xerults		Xererts

TABLE 3.6 Formative Elements in Names of Suborders in *Soil Taxonomy*

Formative element	*Derivation*	*Connotation of formative element*
alb	L. *albus,* white	Presence of albic horizon (a bleached eluvial horizon)
anthr	Gk. *anthropos,* human	Presence of anthropic or plaggen epipedon
aqu	L. *aqua,* water	Characteristics associated with wetness
ar	L. *arare,* to plow	Mixed horizons
arg	L. *argilla,* white clay	Presence of argillic horizon (a horizon with illuvial clay)
calc	L. *calcis,* lime	Presence of calcic horizon
camb	L. *cambriare,* to change	Presence of cambric horizon
cry	Gk. *kryos,* icy cold	Cold
dur	L. *durus,* hard	Presence of a duripan
fibr	L. *fibra,* fiber	Least decomposed stage
fluv	L. *fluvius,* river	Floodplains
fol	L. *folia,* leaf	Mass of leaves
gyps	L. *gypsum,* gypsum	Presence of gypsic horizon
hem	Gk. *hemi,* half	Intermediate stage of decomposition
hist	Gk. *histos,* tissue	Presence of histic epipedon
hum	L. *humus,* earth	Presence of organic matter
orth	Gk. *orthos,* true	The common ones
per	L. *per,* throughout time	Of year-round humid climates, perudic moisture regime
psamm	Gk. *psammos,* sand	Sand textures
rend	Modified from Rendzina	Rendzinalike—high in carbonates
sal	L. *sal,* salt	Presence of salic (saline) horizon
sapr	Gk. *sapros,* rotten	Most decomposed stage
torr	L. *torridus,* hot and dry	Usually dry
turb	L. *turbidus,* disturbed	Cryoturbation
ud	L. *udus,* humid	Of humid climates
ust	L. *ustus,* burnt	Of dry climates, usually hot in summer
vitr	L. *vitreus,* glass	Resembling glass
xer	Gk. *xeros,* dry	Dry summers, moist winters



	Dominant feature of great group		
	Argillic horizon	*Archetypical with no distinguishing features*	*Old land surfaces*
Mollisols			
1. Aquolls (wet)	Argi*aquolls*	Hapl*aquolls*	—
2. Udolls (moist)	Argi*udolls*	Hapl*udolls*	Pale*udolls*
3. Ustolls (dry)	Argi*ustolls*	Hapl*ustolls*	Pale*ustolls*
4. Xerolls (Med.)[a]	Argi*xerolls*	Haplo*xerolls*	Pale*xerolls*
Alfisols			
1. Aqualfs (wet)	—	—	—
2. Udalfs (moist)	—	Hapl*udalfs*	Pale*udalfs*
3. Ustalfs (dry)	—	Hapl*ustalfs*	Pale*ustalfs*
4. Xeralfs (Med.)[a]	—	Haplo*xeralfs*	Pale*xeralfs*
Ultisols			
1. Aquults (wet)	—	—	Pale*aqults*
2. Udults (moist)	—	Hapl*udults*	Pale*udults*
3. Ustults (dry)	—	Hapl*ustults*	Pale*ustults*
4. Xerults (Med.)[a]	—	Haplo*xerults*	Pale*xerults*

[a] Med. = Mediterranean climate; distinct dry period in summer.

TABLE 3.7 Formative Elements for Names of Great Groups and Their Connotation

These formative elements combined with the appropriate suborder names give the great group names.

Formative element	*Connotation*	*Formative element*	*Connotation*	*Formative element*	*Connotation*
acr	Extreme weathering	fol	Mass of leaves	petr	Cemented horizon
agr	Agric horizon	fragi	Fragipan	plac	Thin pan
al	High aluminum, low iron	fragloss	See *frag* and *gloss*	plagg	Plaggen horizon
alb	Albic horizon	fulv	light-colored melanic horizon	plinth	Plinthite
and	Ando-like	gyps	Gypsic horizon	psamm	Sand texture
anhy	Anhydrous	gloss	Tongued	quartz	High quartz
aqu	Water saturated	hal	Salty	rhod	Dark red colors
argi	Argillic horizon	hapl	Minimum horizon	sal	Salic horizon
calc, calci	Calcic horizon	hem	Intermediate decomposition	sapr	Most decomposed
camb	Cambic horizon	hist	Presence of organic materials	somb	Dark horizon
chrom	High chroma	hum	Humus	sphagn	Sphagnum moss
cry	Cold	hydr	Water	sulf	Sulfur
dur	Duripan	kand	Low-activity 1:1 silicate clay	torr	Usually dry and hot
dystr, dys	Low base saturation	lithic	Near stone	ud	Humid climates
endo	Fully water saturated	luv, lu	Illuvial	umbr	Umbric epipedon
epi	Perched water table	melan	Melanic epipedon	ust	Dry climate, usually hot in summer
eutr	High base saturation	molli	With a mollic epipedon	verm	Wormy, or mixed by animals
ferr	Iron	natr	Presence of a natric horizon	vitr	Glass
fibr	Least decomposed	pale	Old development	xer	Dry summers, moist winters
fluv	Floodplain				

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and	Ando-like	gyps	Gypsic horizon	psamm	Sand texture
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aqu	Water saturated	hal	Salty	rhod	Dark red colors
argi	Argillic horizon	hapl	Minimum horizon	sal	Salic horizon
calc, calci	Calcic horizon	hem	Intermediate decomposition	sapr	Most decomposed
camb	Cambic horizon	hist	Presence of organic materials	somb	Dark horizon
chrom	High chroma	hum	Humus	sphagn	Sphagnum moss
cry	Cold	hydr	Water	sulf	Sulfur
dur	Duripan	kand	Low-activity 1:1 silicate clay	torr	Usually dry and hot
dystr, dys	Low base saturation	lithic	Near stone	ud	Humid climates
endo	Fully water saturated	luv, lu	Illuvial	umbr	Umbric epipedon
epi	Perched water table	melan	Melanic epipedon	ust	Dry climate, usually hot in summer
eutr	High base saturation	molli	With a mollic epipedon	verm	Wormy, or mixed by animals
ferr	Iron	natr	Presence of a natric horizon	vitr	Glass
fibr	Least decomposed	pale	Old development	xer	Dry summers, moist winters
fluv	Floodplain				

TABLE 3.9 Some Commonly Used Particle-Size, Mineralogy, Cation Exchange Activity, and Temperature Classes Used to Differentiate Soil Families.

The characteristics generally apply to the subsoil or 50 cm depth. Other criteria used to differentiate soil families (but not shown here) include the presence of calcareous or highly aluminum toxic (allic) properties, extremely shallow depth (shallow or micro), degree of cementation, coatings on sand grains, and the presence of permanent cracks.

		Cation exchange activity class[b]		*Soil temperature regime class*		
Particle-size class	*Mineralogy class*	*Term*	*CEC / % clay*	*Mean annual temperature, °C*	*>6°C difference between summer and winter*	*<6°C difference between summer and winter*
Ashy	Mixed	Superactive	0.60	<−10	Hypergelic[c]	—
Fragmental	Micaceous	Active	0.4 to 0.6	−4 to −10	Pergelic[c]	—
Sandy-skeletal[a]	Siliceous	Semiactive	0.24 to 0.4	+1 to −4	Subgelic[c]	—
Sandy	Kaolinitic	Subactive	<0.24	<+8	Cryic	—
Loamy	Smectitic			<+8	Frigid[d]	Isofrigid
Clayey	Gibbsitic			+8 to +15	Mesic	Isomesic
Fine-silty	Gypsic			+15 to +22	Thermic	Isothermic
Fine-loamy	Carbonic			>+22	Hyperthermic	Isohyperthermic
Etc.	Etc.					

[a] Skeletal refers to presence of up to 35% rock fragments by volume.
[b] Cation exchange activity class is not used for taxa already defined by low CEC (e.g., kandic or oxic groups).
[c] Permafrost present.
[d] Frigid is warmer in summer than Cryic.

Honeoye: New York State Soil

fine-loamy, mixed, active, mesic glossic Hapludalf

TABLE 3.9 Some Commonly Used Particle-Size, Mineralogy, Cation Exchange Activity, and Temperature Classes Used to Differentiate Soil Families.

The characteristics generally apply to the subsoil or 50 cm depth. Other criteria used to differentiate soil families (but not shown here) include the presence of calcareous or highly aluminum toxic (allic) properties, extremely shallow depth (shallow or micro), degree of cementation, coatings on sand grains, and the presence of permanent cracks.

		Cation exchange activity class[b]		*Soil temperature regime class*		
Particle-size class	*Mineralogy class*	*Term*	*CEC / % clay*	*Mean annual temperature, °C*	*>6°C difference between summer and winter*	*<6°C difference between summer and winter*
Ashy	Mixed	Superactive	0.60	<−10	Hypergelic[c]	—
Fragmental	Micaceous	Active	0.4 to 0.6	−4 to −10	Pergelic[c]	—
Sandy-skeletal[a]	Siliceous	Semiactive	0.24 to 0.4	+1 to −4	Subgelic[c]	—
Sandy	Kaolinitic	Subactive	<0.24	<+8	Cryic	—
Loamy	Smectitic			<+8	Frigid[d]	Isofrigid
Clayey	Gibbsitic			+8 to +15	Mesic	Isomesic
Fine-silty	Gypsic			+15 to +22	Thermic	Isothermic
Fine-loamy	Carbonic			>+22	Hyperthermic	Isohyperthermic
Etc.	Etc.					

[a] Skeletal refers to presence of up to 35% rock fragments by volume.
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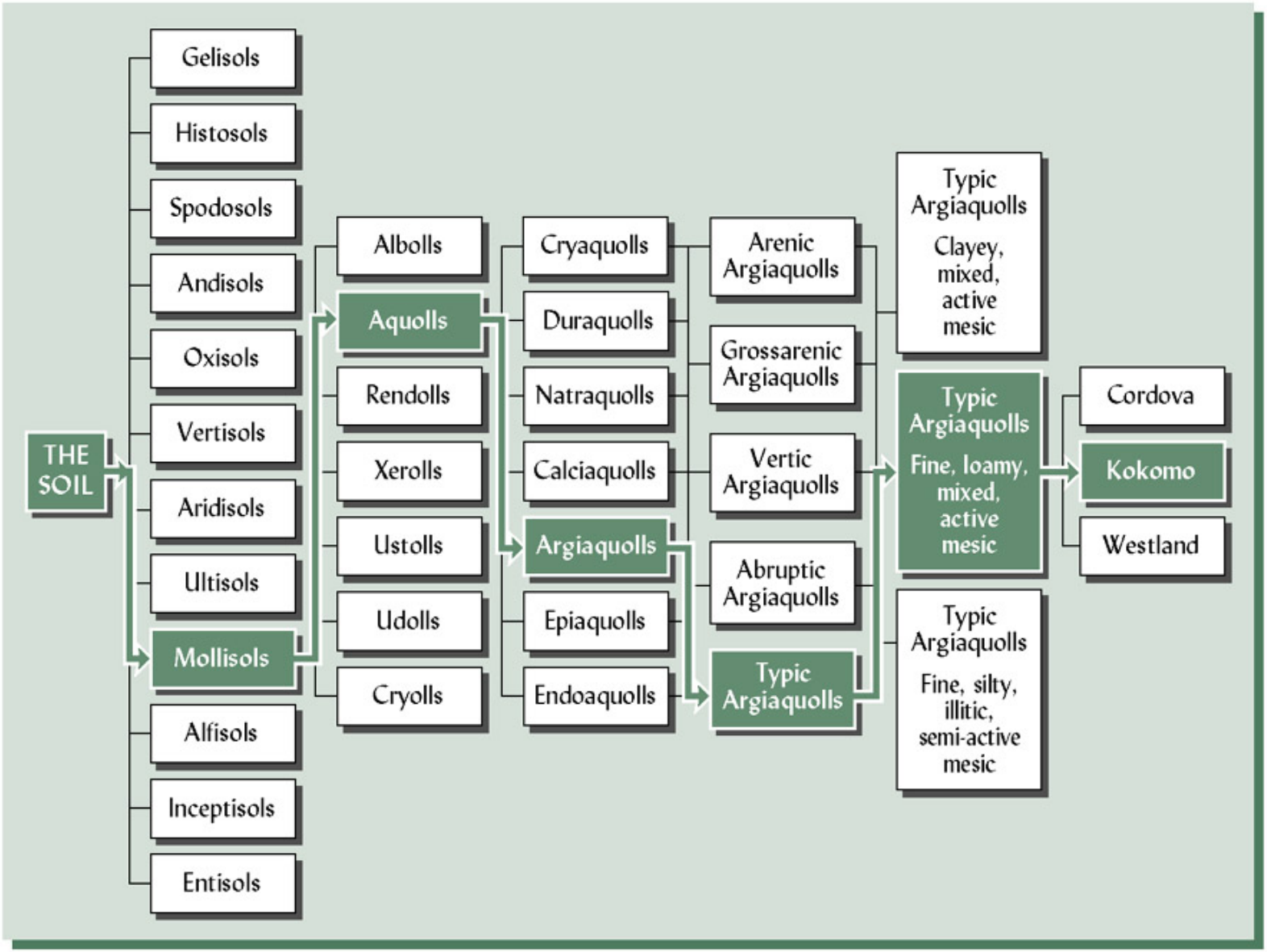
THE SOIL
Gelisols
Histosols
Spodosols
Andisols
Oxisols
Vertisols
Aridisols
Ultisols
Mollisols
Alfisols
Inceptisols
Entisols
Albolls
Aquolls
Rendolls
Xerolls
Ustolls
Udolls
Cryolls
Cryaquolls
Duraquolls
Natraquolls
Calciaquolls
Argiaquolls
Epiaquolls
Endoaquolls
Arenic Argiaquolls
Grossarenic Argiaquolls
Vertic Argiaquolls
Abruptic Argiaquolls
Typic Argiaquolls
Typic Argiaquolls
Clayey, mixed, active mesic
Typic Argiaquolls
Fine, loamy, mixed, active mesic
Typic Argiaquolls
Fine, silty, illitic, semi-active mesic
Cordova
Kokomo
Westland

Description of a Soil Series

- Arkport: Coarse-loamy, mixed, active, mesic Lamellic Hapludalfs
- Mardin: Coarse-loamy, mixed, active, mesic Typic Fragiudepts
- Bath: Coarse-loamy, mixed, active, mesic Typic Fragiudepts
- Collamer: Fine-silty, mixed, active, mesic Glossaquic Hapludalfs
- Hudson: Fine, illitic, mesic Glossaquic Hapludalfs