

Soil Associations of Al-Qassim Region, Saudi Arabia

A.S. Al-Mashhady, M. Reda, and M.A. Hammad
*Soil Science Department, College of Agriculture, King Saud University,
Riyadh, Saudi Arabia*

Abstract. The area studied is located in the central part of Saudi Arabia and is characterized by an arid climate. The study was undertaken by using the technique of photo interpretation. Criteria used to design mapping units were rock type, landform and Soil morphology. Mapping units were checked and described in the field during the reconnaissance soil survey. Accordingly, thirteen soil geographic units were identified, comprising forty five soil associations. The soils are classified as Entisols (Torriorthents, Torrifluvents, Torripsamments) and Aridisols (Salorthids, Paleorthids, Gypsiorthids).

Introduction

The Al-Qassim region is one of the most important agricultural regions in the central part of Saudi Arabia. It is used for wheat production and is a potential area for agricultural expansion. This may be due to the availability of the ground-water and soils. The area of about 46375 km² is a part of Najd province and is located northwest of Riyadh (Fig. 1). The area studied is bounded by longitudes 42° and 45° east and latitude 25° 30' and 27° north.

Saudi Arabia forms a part of the hot belt, and the area studied is characterized by deserts and arid climate. The soil moisture regime is torric and the temperature regime is hyperthermic. The average annual rainfall is about 100mm and evaporation greatly exceeds precipitation throughout the year. Carbon-14 measurements, reported by Al-Sayari and zotl [1], and some morphological features suggest that the climate was more humid during the early and middle Holocene, pleistocene and the pliocene periods.

Geologically, the area is composed of two major landmasses, the Arabian Shield in the west and the Arabian Shelf in the east. The Arabian Shield consists of igneous and metamorphic rocks, while the Arabian Shelf is composed of sedimentary rocks

(Fig. 2). The soils have been formed from the weathering products of these rocks. Wadi Ar-Rimah is the main drainage channel in the region while its flood plain in several places provides good and promising land for agriculture.

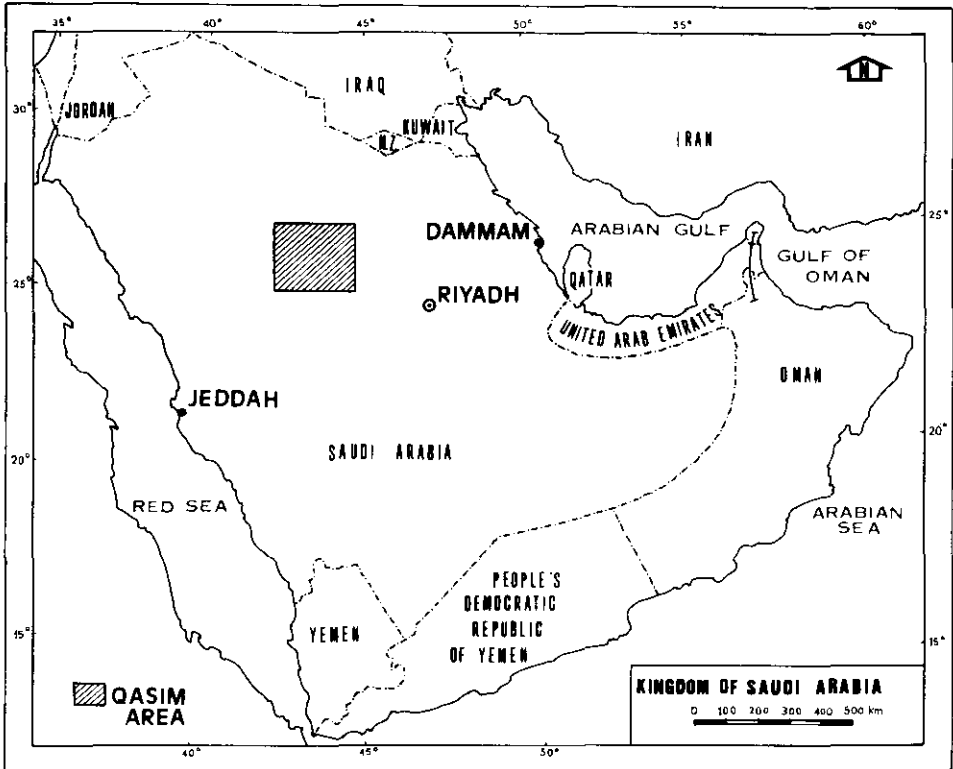


Fig. 1. Map of Saudi Arabia with the Qassim area outlined.

The main objective of the present work was to classify and map the different soils of Al-Qassim region using photo interpretation, fieldwork and laboratory analyses. The completed soil map of Al-Qassim region will provide an important tool for planning future land uses.

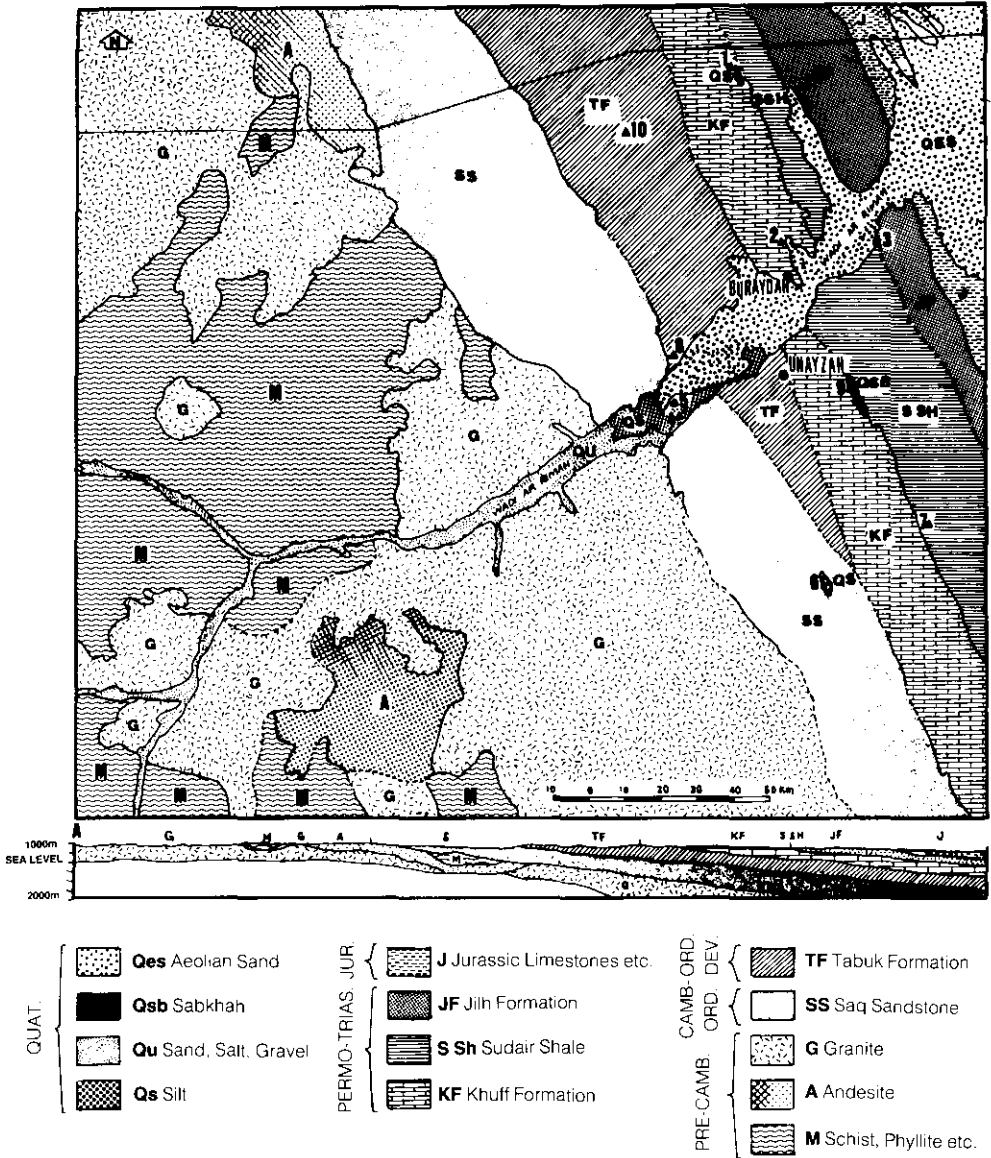


Fig. 2. Geology of the area around the Wadi ar Rimah, with a section along the line from A:—exposed geological boundaries,---- boundaries covered by surface deposits, ▲ profile sites.

Materials and Methods

Air photo interpretation

The photo coverage of the area consists of contact prints at a scale of 1:40.000 compiled on nine mosaic sheets at a scale of 1:100.000. Different soils and mapping unit boundaries were delineated by analyzing the aerial photographs with the stereoscope according to specific elements such as landform, drainage systems, greytone and land use. The photo-analysis was transferred to the mosaics, and these photo-analytical maps were used in the field to check the soil properties and boundaries.

Field work

Soil units were studied in the field by digging pits to approximately 1.5 m depth unless there was rock or a high water table. Samples were collected according to variations in morphological features. A number of observations, including road cuts, drainage course and surface characteristics, were recorded.

Profile descriptions were made according to the procedures outlined by the Soil Survey Staff [2]. The soils were classified according to Soil Taxonomy, [3].

Soil analyses

The following determinations were undertaken; particle size distribution, CaCO_3 , pH, organic matter, cations and anions of saturation extract and the electrical conductivity in saturation extract, [4].

Results and Discussion

The mapping units described in the legend of the soil map of Al-Qassim region are natural units each having common characteristics of landform, rock type, parent material, and soil. Most of the mapping units are given as soil associations because delineation of all soil mapping units was not possible at the scale used and the type of survey carried out. Very small units are incorporated in the description of the large units. Every unit was given a name selected from a town or natural feature in the surrounding area. In this respect, the legend is similar to the land system of Christian and Stewart [5]. The type of soil survey applied was a general reconnaissance. Thus each single body of soil could not be delineated. The mapping units, therefore, are mostly landscape units, easily recognized in the field and having properties not only pertaining to soils but also to other aspects of the environment. Thus the soil map has a variety of uses. An extensive discussion of predictability of a soil map is given by Butler [6].

The differentia used for the map key as shown in Fig. 3 consist of location name, texture classes, surface features landforms, origin of the soils and the relationship between the soils and rocks. The soil mapping units, are as follows:

Soils associated with igneous rocks

These are mainly shallow to moderately deep residual soils formed on different types of granites with some andesites. The distribution is confined to the western side of the studied area at the extremities of the Arabian Shield. The weathering is weak and the products are mainly of primary minerals. The surface ranges from flat to undulating with some shallow wadis in the southern part of the area leading to the main system of Wadi Ar-Rimah, In the northern area, internal basins occur. The soil associations are outlined in the following:

Table 1. Soil occurrence and dominance in the mapping units of Al Qassim Region

	Mapping unit	Dominance		
		Dominant	Subdominant	Minor
Soils associated with igneous rock	Samirah	L. Torriorthents	T. Torriorthents L. Calciorthids	
	Kurush	L. Torriorthents		T. Torrifluvents
	Hibshi	L. Torriorthents		T. Torrifluvents
	Ar Rass	L. Torriorthents		T. Torrifluvents
Soils associated with metamorphic rocks	silsilah	L. Calciorthids	T. Torriorthents	T. Torrifluvents
	Aqlat As Suqur	T. Calciorthids	L. Calciorthids	T. Torrifluvents
	Ath Thuaylibi	L. Torriorthents		T. Torrifluvents
Soils associated with volcanics and basalt	Taba	L. Torriorthents	T. Torriorthents	T. Salorthids
	Hutaymah	L. Torriorthents		
Alluvial soils of wadis	Jarayir	T. Gypsiorthids Calcic Gypsiorthids	T. Salorthids	T. Torrifluvents
	Dath	T. Calciorthids		
	Turmus	T. Torrifluvents	T. Torriorthents	
	Rimah	T. Torrifluvents	T. Salorthids	Torriorthents
	Qasr Ibn Uqayil	T. Torrifluvents	T. Torrifluvents	T. Salorthids
	Badayai	T. Torripsamments		
Soils associated with sandstone and shales	Saq	T. Torripsamments	L. Torripsamments	
	At Tiraq	T. Torripsamments	T. Torriorthents	L. Torriorthents
	Al Bukayriyah	L. Torriorthents	T. Torriorthents	T. Calciorthids
	Al Mustawi	L. Torriorthents	T. Torriorthents	T. Salorthids
	Al Barud	L. Torriorthents		T. Torrifluvents
Soils of gravelly	As Sairah	T. Torriorthents	T. Calciorthids	
	Ar. Rukhman	L. Calciorthids	L. Torriorthents	

Table 1. Cont.

	Mapping unit	D o m i n a n c e		
		Dominant	Subdominant	Minor
Aeolian deposits and Associated soils	Nafud	T. Torripsamments		
	Al Bassam	T. Torripsamments	T. Torriorthents	T. Torrifluvents
	Buraydah	T. Torripsamments		
	Ghamis	T. Torripsamments	T. Salorthids	
	Mushattat	T. Gypsiorthids		T. Torripsamments
Soils of alluvial fans playas and drainage basins (Fayde soils)	Fayde	T. Torrifluvents		
	Ar Ran	T. Torrifluvents	T. Torriorthents	
	Al Mutayniyat	T. Torrifluvents	T. Salorthids	T. Calciorthids
	As Shamasiyah	T. Torrifluvents	T. Torripsamments	
	Nabqiyah	T. Torrifluvents		
	Al Uyun	T. Torrifluvents		
Sabkhas and salt marshes	Awsajiyah	T. Salorthids	Aquollic Salorthids	
	Shuqqah Saafiq	T. Salorthids T. Salorthids		
Soils associated with undifferentiated rocks	Al Butayn	T. Paleorthids	T. Calciorthids	
	As Salabikh	L. Torriorthents		
Soils associated with limestones	Al Wata	T. Calciorthids	L. Torriorthents	
	Al Ghaf	L. Torriorthents		
Soils associated mainly with shales	Zulayyim	T. Torriorthents		
	Junayfah	T. Gypsiorthids		
Soils associated with limestones and shales	Safra Al Asyah	T. Calciorthids	T. Torrifluvents	L. Torriorthents
	Tuwayq	T. Torriorthents	L. Torriorthents	
	Al Midhnab	T. Torriorthents	T. Gypsiorthids	L. Torriorthents

T. and L. Stand for Typic and Lithic, respectively.

Samirah soil association (Sm)

This unit includes soil developed on grey, biotite, hornblende granite with several rhyolitic dikes. The surface is flat to wavy and covered with desert pavement of pebbles and gravels. The soils are generally Torriorthents with minor Calciorthids. Also minor occurrence of Torrifluvents is present along some of the wadis.

Kurush soil association (Kr)

The unit occurs on what seems to be penneplained rocks, the soils are dominantly Lithic Torriorthents with minor occurrences of Typic Torrifluvents along wadis.

Hibshi soil association (Hb)

This occupies an undulating to wavy land, the surface of which is covered with gravel of granitic origin. The soils are fragmental to loamy-skeletal and are usually shallow to very shallow. The dominant soils are Lithic Torriorthents with minor occurrences of Typic Torriorthents.

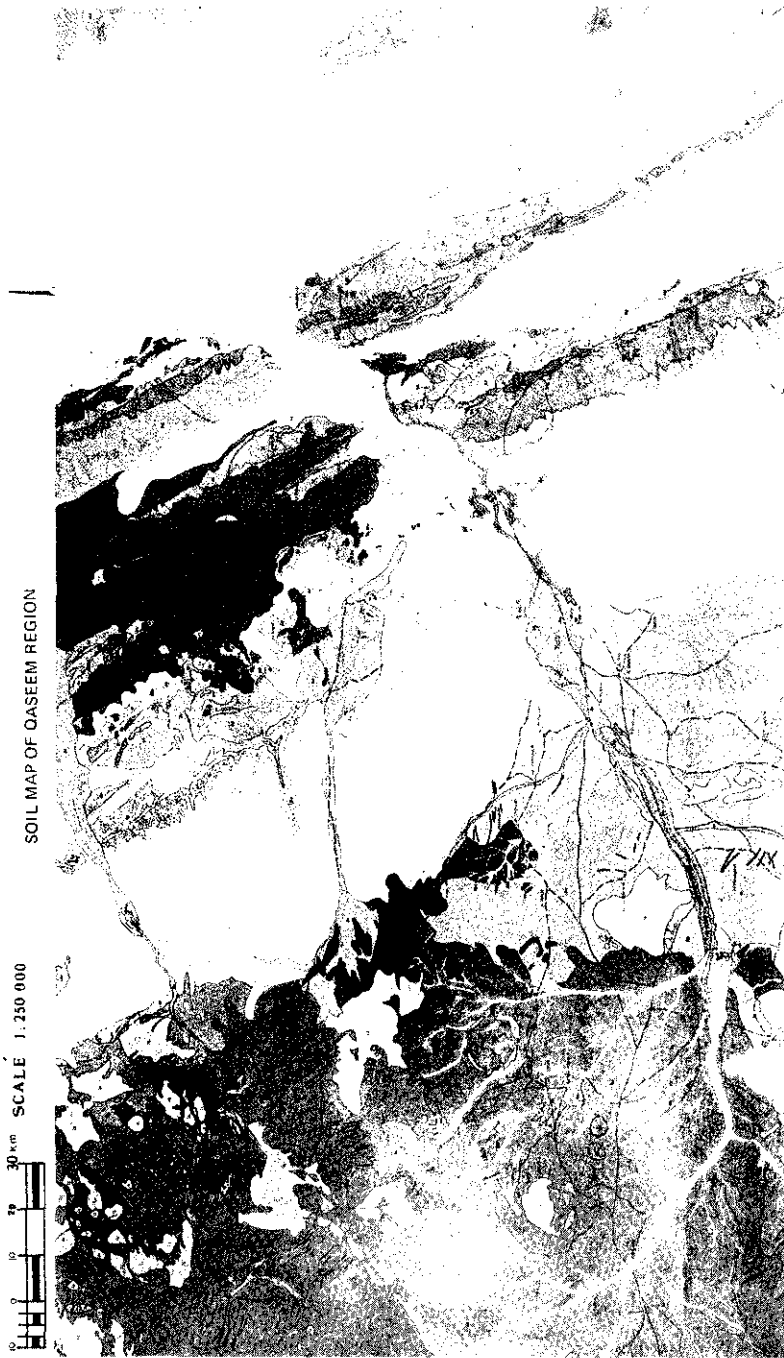


Fig. 3. Soil map of Qassim region.

Ar Rass soil association (Rs)

This unit occupies a vast plain overlying grey granitic gneiss with surface that is wavy to almost flat. Several wadis drain this plain, mainly toward wadi Ar-Rmah. The dominant soils are Lithic Torriorthents with minor occurrences of Typic Torrifluvents and Typic Torriorthents along some wadis.

Soils associated with metamorphic rocks

These soils occupy mainly the southwestern part of the area studied and are developed on slate, conglomerates and precambrian schist, which is commonly calcareous. There are two main landforms. The first is an undulating surface usually covered with shallow to very shallow soils. The second is flat surface with shallow to moderately deep soils, both of which are generally loamy. Desert pavement of gravelly schist fragments covers most of the surfaces and calcic horizons are present at variable depths in most of the soils. Some very narrow wadis form a drainage network along which the soils are usually Torrifluvents. On the north western side along the edge of the Arabian Shield, very shallow reddish soils are developed on felsitic rocks. The soil associations present are:

Silsilah soil association (S1)

This association occupies the area around Jabal Silsilah where the soils are dominated by Lithic Calciorthids. These soils have limited leaching hence the accumulation of salts at the bottom of the profiles. Weathered fragments of schist are found within the profiles. Where these fragments are at the surface, commonly due to deflation they are affected by wind abrasion.

Aqlat as suqur soil association (Aq)

This unit is an almost flat plain with rare outcrops of schist or schistose rocks. The wadis are usually wide and shallow and have Torrifluvents. Otherwise the soils are mainly Calciorthids.

Ath thuaylibi soil association (Th)

These are the soils of the felsitic rocks which are variable in colour but are commonly reddish. The soils retain the red colour of the parent rocks. The unit is usually higher in elevation than the surrounding areas and is covered with very shallow rocky Lithic Torriorthents.

Soils associated with volcanics and basalt

Areas covered with lava flows generally constitute hills that were probably preserved by the lava. On some of these hills, soils buried beneath the lava could be seen. No visible development of the buried soils was observed. The lava is consolidated and includes pieces of tuffs and lava fragments. Some very wide and shallow wadis are present in the area, This group has two units:

Taba soil association (Tb)

The unit is mainly composed of soils derived from granitic rocks but mixed with volcanic materials. The area is mainly eroded by water most probably during former times. The soils are mainly Torriorthents with minor areas of Salorthids.

Hutaymah soil association (Hu)

The surface of this unit is wavy to undulating and is generally occupied by Lithic Torriorthents.

Alluvial soils of wadis

These soils are found in the wadi system of Ar-Rimah. and its tributaries which cut through the schists in the southwest of the area. The eroded material therefore, is a mixture of these rocks and can vary from place to place. Material derived from the schist is mainly confined to the southwest at Jarayir where there is secondary gypsum probably inherited from the primary formations within the schist and schistose rocks. As calcium carbonate is also a component of the calcareous schistose rocks secondary accumulation of calcium carbonates also occurs.

Where the main course crosses the granite area two units are formed, Ar-Rimah and Qasr Ibn Uqayil. The Wadi bottom is usually composed of very deep clayey materials (Ar-Rimah), which is sometimes saline, while the flanks of this part of the wadi are dominated by sandy and loamy materials intercalated in areas with pebbles and gravel (Qasr Ibn Uqayil). Whether Qasr Ibn Uqayil was originally a terrace of a former wadi course, is not verified, but composition of materials suggest a former terrace.

The upper course of the Dath tributary drains felsitic rocks while the lower course crosses granites. The materials deposited along this wadi are characterised by the presence of secondary carbonate enrichments throughout the soil.

The lower course of wadi Ar-Rimah is usually wide clayey soils and low sandy borders. Flooding occurs over the sandy borders of this part. Consequently, some layers of loamy materials are deposited on the original sandy surface (Badayai). The delta like part of this wadi at its eastern extremity is dominated by sabkhas where the wadi is buried by the Nafud unit. This condition is responsible for the formation of highly saline soils. The following units are present;

Jarayir soil association (Jr)

This unit is essentially composed of Typic Gypsiorthids, Calcic Gypsiorthids, Salorthids and Torrifuvents.

Dath soil association (Dh)

This unit is dominated by Calciorthids but Torrifuvents may be found in its upper part.

Turmus soil association (Tm)

This association is composed of gravelly and pebbly soils. It is located along wadi Turmus in the northern area connected with the gravelly plains.

Rimah soil association (Rm)

Those are the Torrifluvents, the Salorthids and the Torriorthents.

Qasr Ibn Uqayil soil association (Qs)

This unit occupies the terraces and flanks of wadi Ar-Rimah where the soils are usually gravelly and sometimes intercalated with layers of pebbles and gravels (Typic Torriorthents). Torrifluvents and Salorthids are also present in association with the Torriorthents.

Badayhai soil association (Bd)

Flooding of Wadi Ar-Rimah can overflow adjacent areas of sand dunes resulting in deposition of fine materials over the sand, the depth of fine material varies from place to place. Where it forms thin surface layers, the soils are considered Torripsamments. Where the fines are deeper, the soils are Torrifluvents. Minor Salorthids occurrences are also present due to high evaporation and capillary rise.

Soils associated with sandstones and shales

This group of soils occupies a tract from north to south corresponding to the sandstone Saq formation, the escarpment foot of Jal Attiraq, some areas of the Al-Mustawi plain, and some other Minjur and Tabuk sandstone areas. Most of the soils occurring in these areas are sandy in texture, especially those developed on the Saq formation. Other soils occurring on the Al-Mustawi surface and its extension around Al-Barud village are usually loamy in texture.

The land surface of these soils is almost flat but some areas, especially in the northern part of the saq unit, range from wavy to undulating. Sandstone rock outcrops over large areas of the Saq formation, especially in the north. Sand sheets extend over some parts of the area. Soil associations of the group of soils consist of the following:

Saq soil association (Sq)

This association covers a large part of the area with mainly reddish soils of sandy texture. The surface is wavy to undulating. Remnants of the dissected sandstone rock, in several forms, are scattered in many places especially in the northern area. Lithic Torripsamments are dominant, but Typic Torripsamments constitute a considerable area.

At Tiraq soil association (Tr)

This association occurs mainly on the Tabuk formation but also covers parts of

the Saq formation. Typic Torripsamments are dominant, Typic Torriorthents subdominant and Lithic Torriorthents are minor.

Al-Bukayriah soil association (Bk)

This association occurs in small flat to hilly low lying areas around Al-Bukayriah and Ad Dalfaah villages. The soils are formed mainly on the Tabuk formation and have loamy texture in general. The dominant soils are Lithic Torriorthents. Subdominant soils are Typic Torriorthents. Calciorthids are minor.

Al-Mustawi soil association (Ms)

These are usually reddish fine loamy soils formed on sandstone interbedded with shale and shaly sandstone. The surface Minjur sandstone weathers to give sinkholes which are scattered throughout the area. Salorthids usually occupy the bottoms of these sinkholes. Dominant soils surrounding these basins are Lithic Torriorthents.

Al Barud soil association (Br)

This group of soils occurs on a surface that is moderately dissected by drainage courses descending from the consequent parallel scarps. The dominant soils are Lithic Torriorthents with minor occurrences of Torrifuvents.

Soils of gravelly plains

The soils of this group are generally skeletal and developed on gravelly materials deposited by old streams. But there may be loam or silt filling interstices between gravel. In addition to gravelly areas of the old streams, gravels also occur in and around Ar-Rukhman village, where a gravel bed is exposed. Recent superficial streams are also present but these are too weak to make a considerable change in the deposition. However, the arid condition resulted in wind erosion and deposition of sand sheets and hummocks. Gravel ridges scattered throughout the area around as remnants of erosion and peneplanation. Lime segregation is abundant in the area. While the gravel areas of the old streams are of transported origin. The group consists of two associations:

As Sairah soil association (As)

These soils are fragmental with gravelly almost flat to wavy surfaces. Sand sheets blanket some areas.

The dominant soils are Torriorthents while the subdominants are Calciorthids.

Ar Rukhman soil association (Rr)

These are also fragmental soils covered with desert pavement. The surface is rolling to hilly and the dominant soils are Calciorthids with minor occurrences of Torriorthents.

Aeolian deposits and associated soils

Soils of this group occupy the large dune areas of Nafud Ath Thuwayrat, the continuation of Nafud Ad Dahma, and Nafud As SIRR. Other sandy areas are found bordering the dune areas, in depressions between the dunes, and in areas of Nafud along stream banks that are flooded by water. The soil associations belonging to this group are the following:

Nafud soil association (Nf)

Torrripsamments are dominant in the Nafud areas, i.e., the sand dune areas. Most if not all of these areas, are composed of moving sands surface that are either eroded or covered. Whether this is considered soil or not is questionable.

Al Bassam soil association (Bs)

This association is found along the boundaries of dune areas. Sand sheets with variable thickness may cover other soils and form Torrripsamments or Torriorthents depending on the depth of the sand cover. When loamy materials along minor wadis are within the control section of the profile, Torrrifluents are developed, but these latter soils are only minor and are usually overlain by aeolian deposits.

Buraydah soil association (Bu)

These are the Torrripsamments that occur in some depressions between the dunes, and the almost flat sandy areas of the southern and eastern extremities adjacent to dune areas. Most probably the aeolian deposits cover loamy materials with a better water holding capacity. In Ynayza area, the cultivated lands are essentially alluvial fans descending from the higher cuesta area.

Ghamis soil association (Gh)

These soils are the deep sandy Torrripsamments that are Periodically flooded after heavy rains. Deposit of loamy materials, however, are not deep-enough to justify Torrrifluents designation. Salorthids are present in some areas of poorly drained soils.

Mushattat soil association (Mu)

These are the soils adjacent to dune areas that are significantly affected by wind erosion. The substratum is usually gypsum-rich shale from which Gypsiorthids develop while areas covered with windblown sand, have Torrripsamments.

Soils of alluvial fans playas and drainage basins (fayde soils)

The soils formed on drainage basins, playas and alluvial fans are included in this group and are flooded occasionally during the winter season. They are moist or wet after heavy rainfalls. The main feature of these soils is the occurrence of stratified materials. Loamy material is dominant, but some layers may be sandy. In some mapping units adjacent to sand dune areas the soils are covered with sand layers which

alternate with loamy layers. These may be of aeolian origin in areas susceptible to wind erosion but can also be of alluvial origin. This group consists of the following associations:

Fayde soil association (Fd)

Most of these soils occur in small drainage basins scattered in an undulating to almost flat surface. They are calcareous Typic Torrfluents with textures dominated by loams.

Ar Ran soil association (Ar)

These soils generally occupy drainage courses, at some shallow basins. At the bottom of the basins and in the lower drainage courses, there are Typic Torrfluents. Lithic Torriorthents occupy margins and terraces.

Al Mutayniyat soil association (Mt)

This association includes soils formed on limestone clay gypsum and calcari-nites. They are usually stratified, and well to poorly drained. Some Salorthids have developed in the poorly drained areas, but Typic Torrfluents are dominant. The soils are generally calcareous but they do not qualify for Calciorthids except in small areas where calcic horzions have developed.

As Shamasiyah soil association (Sh)

The soils in this mapping unit constitute the fan areas adjacent to Nafud (sand dunes) or areas covered with windblown sand. The soils are dominated by Typic Torrfluents where the sand cover is thin and Typic Torripsamments where the sand cover is thick.

Nabqiya soil association (Nb)

These are the red Torriorthents associated with the drainage basins of Minjur sandstone.

Al Uyun soil association (Uy)

The soils of Al Uyun association have in general fine textured layers mixed with gypsum crystals, but the surface may have coarser textures. Typic Torrfluents are the dominant soils, but some areas are covered with sand sheets to a considerable depth. In these areas the soils are Torripsamments.

Sabkhas and saltmarshes

Sabkhas and saltmarshes are the closed drainage basins with permanent high water tables. Leaching is limited, and due to the very high evaporation occurring during most of the year, salts are concentrated either in the form of surface crusts or as efflorescences throughout the entire depth of the soil. Most of these areas have water tables just a few centimeters below the surface, or they contain water bodies forming

brines. These water bodies are found in the lowest part of these depressions. The margins are inundated only after heavy rains. The following associations are included in this group:

Awsajiyah soil association (Aw)

This association consists of poorly drained soils, often saturated with water and having very high salinity. Alternating layers of humified black organic matter are present in some areas and the natural vegetation is dominated by hallophytes. Typic Salorthids are dominant, while Aquollic Salorthids are the subdominant soils.

Shuggah soil association (Su)

These are saline sandy soils, in general, with impeded drainage thus Typic Salorthids are dominant.

Saafiq soil association (Sa)

This association consists of Salorthids in closed drainage basins.

Soil associated with undifferentiated rock

The soils occupying the duricrust formation in the area and another tract at the far east are placed in this group. At present the rocks are undifferentiated. This group consists of two associations:

Al-Butayn soil association (Bt)

This association occurs in the duricrust area where petrocalcic horizons are present in most of the soils thus, Paleorthids are developed. Other soils have uncemented calcic horizons and are Calciorthids.

As Salabikh soil association (Ss)

This association consists of coarse loamy soils that contain gravel and is usually dominated by Torriorthents.

Soils associated with limestone

These soils are generally calcareous in nature but calcic horizons may not develop in every soil, although secondary carbonates in different forms may be present throughout the whole depths of the profiles. This group comprises two associations:

Al Wata soil association (Wa)

These are the loamy soils dominated by Calciorthids and Torriorthents. The surface is almost flat with numerous sinkholes.

Al Ghaf soil association (Aq)

The soils of this association are generally reddish and loamy in texture and dominated by Torriorthents but some Calciorthids are also present.

Soils associated mainly with shales

These soils are developed mainly on shales. In areas adjacent to sand dunes the surface may be covered with sand sheets with variable thickness. The group consists of two associations:

Zulayyim soil association (Zi)

This association is composed of sandy and coarse loamy soils that are stratified in some areas. Desert pavement of shale gravels and pebbles that have undergone stages of physical weathering are present. The dominant soils are Torriorthents and there are also rock outcrops. Torripsamments occur in areas adjacent to sand dunes.

Junayfah soil association (Jn)

This association is dominated by Gypsiorthids as the dominant soils, but Torripsamments and Torriorthents are also present where considerable depth of sand covers the original soil.

Soil associated with limestones and shales

These soils occupy the almost flat to wavy surface of limestones and shales. The soil parent materials are in the form of transported fans. The following associations within this group are;

Safra Al Asyah soil association (Sf)

Soils developed on limestone surfaces under the prevailing climatic conditions are usually Lithic Torriorthents with few occurrences of Calciorthids. Torrifluents occur along alluvial fans.

Tuwayq soil association (Ta)

The dominant soils of this association are Torriorthents formed along Tuwayq mountain. Other soils that occur are Calcorthids.

Al Midhnab soil association (Md)

These are mainly the highly gypsiferous soils that are classified as Gypsiorthids. Gypsum is originally included in the rock structure and gypsic horizons develop in these soils. Torriorthents are also present.

The rocky land

Rock lands are classified according to rock type and landforms. This classification helps in evaluating the land use for future planning. The following are the main units:

Igneous mountains and hills (Iq)

Mountains and hills composed of metamorphic rocks, plateaus, cuestas, escarpments, erosion remnants and ridges of sedimentary rocks.

References

- [1] Al Sayari, S.S. and Zotl, J.G. (Eds.) *Quaternary period in Saudi Arabia*. New York: Springer verlag, Wien, 1978.
- [2] Soil Survey Staff. *Soil survey manual*. U.S. Department of Agriculture Handbook No. 18 1951.
- [3] Soil Survey Staff. *Soil Taxonomy. A Basic System of Soil Classification for Making and Interpreting Soil Surveys*, Agric. Handbook No. 436, Soil conservation surveys, U.S. Department of Agriculture, 1975.
- [4] Al-Mashhady, A.S., Hammad, M.A. and Reda, M. "Soil Resources and Potential for Al-Qassim Region." *Report to the Agric. Res. Center, College of Agriculture, King Saud University, Riyadh, Saudi Arabia* (1986).
- [5] Christian, C.S., and Stewart, G.A. "General Report on Survey of Katherine-Darwin Region." 1946, *CSIRO Aust. Land Res. Ser.*, No. 1 (1953).
- [6] Butler, B.E. *Soil Classification for Soil Survey*. Oxford: Clarendon Press, 1980.

ترب منطقة القصيم بالمملكة العربية السعودية

عبد سعود المشهدي، محمد رضا بيومي ومحمد أحمد مصطفى حماد
قسم علوم التربة، كلية الزراعة، جامعة الملك سعود، الرياض،
المملكة العربية السعودية

ملخص البحث. تقع منطقة القصيم بالمنطقة الوسطى بالمملكة العربية السعودية وتتميز بمناخ صحراوي جاف، تتكون المنطقة من صخور مختلفة مثل الصخور النارية والمتحولة والمتواجدة بالجزء الغربي ضمن الدرع العربي أما باقي المنطقة فتتكون من الصخور الرسوبية المكونة للرف العربي.

الهدف من الدراسة هو التعرف على أنواع الترب المختلفة وعمل خريطة تربة للمنطقة موضعاً عليها أنواع الترب وتعتبر خريطة التربة المتحصل عليها ذات أهمية كبيرة في مجال التخطيط والاستغلال الزراعي الأمثل لمنطقة القصيم.

ولقد تم عمل حصر استكشافي للمنطقة باستخدام الصور الجوية ورسمت خريطة التربة بناء على الدراسة الحقلية والتحليلات المعملية، ولقد كان لنوع الصخر، الوحدات الجيومورفولوجية والخواص المورفولوجية للتربة دور كبير في التفرقة بين الوحدات الخرائطية، ولقد تم الحصول على ١٣ وحدة خرائطية بها ٤٥ تصاحب تربة، ولقد قسمت الترب حسب التقسيم الأمريكي الحديث إلى رتبي الـ (Entisols (Torrifluvents, Torripsammentes, Torriorthents) والـ (Aridisols (Paleorthids, Gypsiorthids, Calciorthids, Salorthids).

