CRITERIA FOR RANGE CONDITION CLASSIFICATION

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by

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1. Objective

The objective is to provide a first approximation of range condition classes over a large and relatively unknown region for immediate use in preparing range management plans for Range and Livestock Associations.

2. Factors to be considered

The following factors must be considered in designing the classification:

(a) Shrubs are an important, if not the most important, source of forage and vegetative cover throughout most of the area.

(b) Rangelands of the area support four major types of livestock all of which are likely to use any part of the area.

(c) Shifting agriculture is locally common to abundant and, where present, a major factor influencing vegetation and soil dynamics with or without the assistance of livestock.

(d) Information on the ecology and management of the central rangelands, which could be used to develop site-specific range condition classifications, is either scarce or totally lacking.

(e) There is an immediate need for some form of range condition classification on which to base range management plans for local Range and Livestock Associations.

3. Type of classification required

Therefore, a classification must be developed which can be carried out quickly and easily and which can be applied equally well to all, or most, range sites with a minimum of knowledge aboout the local ecology. Such a classification will, necessarily, define only broad generalized condition classes. More accurate classifications

of range condition will become possible as more detailed information is obtained on the general ecology and on soil, vegetation and livestock responses to management on individual range sites.

4. Approach

The classification is made up of three components and 10 sub components thought to be sensitive to and reflect (a) the ecological stability of the rangeland system and (b) its ability to sustain production of quality forage for livestock.

More specifically, the classification components and sub components are used as indices of the following rangeland system characteristics (Table 1).

(a) Gross characteristics of the soil surface reflecting erosional processes and moisture infiltration.

(b) Forage value of plant species.

(c) Stage of secondary succession.

(d) Accumulated degree of utilization of existing vegetation

(e) Plant health.

In the field, each sub component is rated on a scale from 0 to 3 based on its approach to optimal or minimal condition respectively. Rating classes are presented in such a way that they can be made by eye. Measurements are too time consuming and are apt to have strong site-specific implications.

Component ratings are obtained by averaging their sub component ratings. The final rating for the stand in question is obtained by averaging the component ratings. These are expressed directly in terms of range condition using the criteria shown in Table 2. The terminology used for the classes in Table 1 is relative. Depending on the emphasis desired, the classes could also be "very good, good, fair and poor", or just "1,2,3 and 4".

For the present, each sub component is given equal weight as are each of the three components; soils, herb layer and shrub layer. However, the classification (Table 3) can be modified to fit a variety of differing circumstances (range sites). This can be done by dropping a sub component which is not applicable to that range site or by weighting sub components differently as they are seen to vary as indicators of range condition for that range site.

For instance, none of the shrub components are of use for coastal plain grassland because it lacks shrubs. Similarly, as the coarse sands of the coastal plains do not crust over, this sub component is of no value there either. Again, should there be a need to classify range condition with particular respect to, say, browsers, the shrub component and its sub components could be given more weight than the other components. If there is sufficient knowledge about the ecology of an area then sub components crown vigor and herb layer composition, which assume such knowledge, can be used. Otherwise they need not be and the herb layer component can be represented by the growth form sub component alone.

Table 1. Components and sub components of the range condition classification and the attributes they reflect.

Component Subcomponent	Attribute
Soil	
Erosion(1)	Degree of soil loss
Trails	Soil cover; liklihood of erosion
Crust	Soil moisture infiltration; surface run-off; liklihood of erosion.
Litter	Soil cover; vegetation abundance
Herb layer	
Growth form((2)	Accumulated utilization of existing vegetation; successional status.
Crown vigor(3)	Plant health and vigor; successional status.
Composition(3)	Successional status; forage quality.
Shrub layer	
Composition(2)	Forage quality
Hedging(4)	Accumulated utilization of existing vegetation.
Vigor	Shrub health relative to utilization.

(1) This refers to "accelerated" erosion caused by mans activities rather than "geological" or naturally occuring erosion.

(2) Requires knowledge of general palatability i.e., palatable or not palatable. Usually just ask herdsmen.

(3) Assumes a prior knowledge of an area's ecology.

(4) Requires knowledge of shrub hedgeability. Generally, palatable, unarmed shrubs are hedgeable.

Table 2. Rating criteria for range condition classes

Condition class	Rating
Good	0.00 - 0.59
Fair	0.60 - 1.59
Poor	1.60 - 2.59
Very poor	2.60 - 3.00

5. The classification

Table 3. Guide lines for classifying range condition in the central rangelands

Rating Component Subcomponent	Criteria
Soils	
Erosion	
0	Soil is level, microtopography is present but slopes are gentle; no sign of soil movement.
1	Plants elevated but slopes gentle and angles obtuse or rounded; and/or some indication of soil loss as in the piling of sand in or on one side of plant or the presence of micro ripples on sandy surfaces (see Figures 1,2 & 3).
2	Plants considerably elevated on pedastals with abrupt sides and/or evidence of considerable soil movement as shown by the common occurrence of sand piles and blow outs or of small rills and gullies (see Figures 4,5 & 6).
3	Abrupt elevated pedastals with plant roots exposed and/or evidence of much soil movement as shown by one or more of the following: (a) hummocks, (b) plants nearly covered with sand or roots almost completely exposed by wind erosion, (c) gullies and rills common, (d) sand dune formation (see Figures 7,8,9,10,11,12 & 13).
Trails	
0	Few or none; may not immediately apparent.
1	Present; several trails may be seen over an area of about one hectare (see Figure 14).
2	Many; may be readily apparent when viewed from one spot; over 10% surface area in trails (See Figures 15 & 16).
3	Obliberated by surface erosion so that only bare soil exists. This applies only where it is

obvious that livestock have caused removal of vegetation as, for instance, near villages or boreholes or on major routes of livestock movement (see Figure 17).

Surface crusting

0 No surface crust.

1 Little or no hard surface crust but small areas with swept appearance.

2 Large areas between plants appear to have been swept and packed (see Figure 18).

3 Most bare areas between plants appear swept and packed (see Figure 19).

Litter

0 Herbaceous Litter present and fairly equally distributed (see Figures 20 & 21).

1 Herbaceous litter distributed contageously (scattered groups) particularly in protected areas (see Figure 22).

2 Herbaceous litter occurs only in definite dams or is almost absent. Most litter is woody (twigs and bits of bark).

3 Herbaceous litter absent but some woody litter may occur (see Figure 23).

Herb layer

Growth form (1)

0 Palatable bunch grass form obvious and dominant - easily seen; culms and leaves abundant and tall (see Figure 24).

1 Palatable bunch grass form apparent. Culms and leaves common but short (see Figure 25).

2 Palatable bunch grass form not distinct, i.e., you must concentrate your attention to see it. Culms and leaves are small and few for the size of the crown. Mat forming (stolonferous/rhizomatous) grasses may be present (see Figures 26 & 27).

3 Palatable bunch grass form absent. Mat forming grasses/sedges, forbs or annual grasses dominate or vegetation is entirely absent (See Figures 28 & 29).

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(1) This does not apply to grasses growing in bushes or under low, dense shrub crowns which afford protection from grazing.

Crown vigor

0 Decreaser crowns healthy

1 Decreaser crowns unhealthy / increaser crowns healthy.

2 Increaser crowns unhealthy / invader crowns healthy.

3 Invader crowns unhealthy.

Composition

0 Decreasers / increasers share dominance.

1 Increasers dominant.

2 Increasers / invaders share dominance.

3 Invaders dominant.

Shrubs

Composition

0 Highly palatable and palatable shrubs share dominance.

1 Palatable shrubs dominant.

2 Palatable and less palatable shrubs dominant.

3 Less palatable and unpalatable shrubs dominant.

Hedging (1)

0 Most hedgeable shrubs are lightly to moderately hedged (1).

1 Hedgeable shrubs are moderately to heavily hedged.

2 Hedgeable shrubs are heavily to very heavily hedged.

3 Some usually unhedgeable shrubs are hedged.

(1) See Table 4 and appended notes on the next page for guide to degree of hedging and for an explanation of "hedgeability".

Shrub vigor

0 Few or no decadent shrubs.

1 Some shrubs are decadent because of hedging.

2 Some shrubs are dead because of hedging.

3 Many shrubs are decadent and dead from hedging.

Table 4. Guide to degree of hedging (1,2,3)

Degree	Criteria
Little	Shrubs show little or no browsing and retain their normal shape (see Figure 30).
Moderate	Shrubs show truncated branches; near normal branching and retain normal shape.
Heavy	Shrubs show abnormal growth (secondary branching), most branches are truncated, new growth may occur from large woody stem. It is apparent that browsing is influencing the shape of the shrub (see Figure 31).
Very heavy	Little or no branching is apparent. Shrub resembles a well trimmed mound or hedge. New growth occurs from large woody stem (or), for those shrubs with branches too stout and/or widely spaced to "mound", the crowns periphery is smooth, showing no irregularities. Secondary branching may be obvious (see Figures 32 & 33).

(1) Shrubs are usually hedgeable in inverse proportion to their thorniness; unarmed shrubs are hedgeable, those with weak thorns/spines are less so and those with heavy, stout and sharp thorns/spines are least so.

(2) Only palatable deciduous shrubs are considered here. Evergreen shrubs are apt to always be heavily browsed - regardless of their palatability - because they are a principal forage in the dry season.

(3) The sensitivity of this classification is greatest when a stand of vegetation contains plants of a variety of palatabilities and hedgeabilities. comparisons can then easily be made of the degrees of hedging in each case.

6. Illustrative figures

Fig. 1. Micro ripples can be seen in the foreground of the photo.

Fig. 2. Example of an elevated plant on a low, gently sloped pedastal.

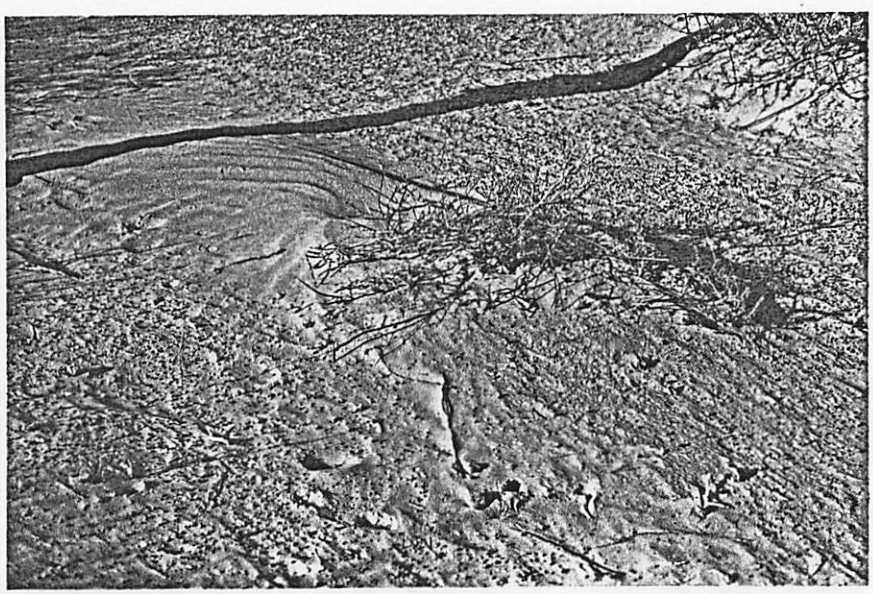

Fig. 3. Sand deposited on one side of a plant.

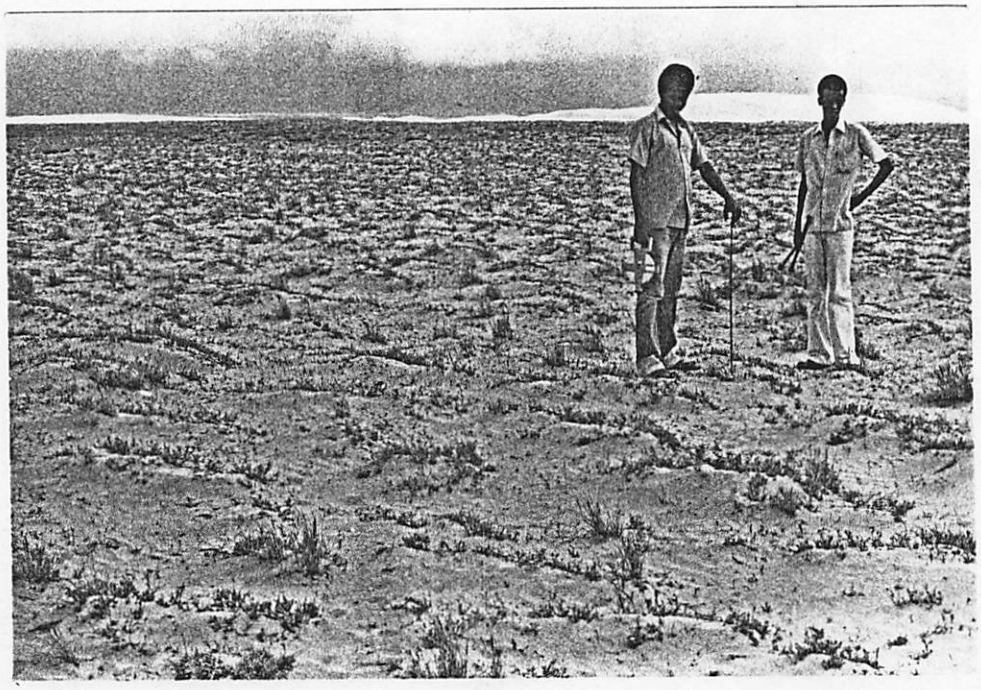

Fig. 4. A large area where sand is being deposited against the sides of plants.

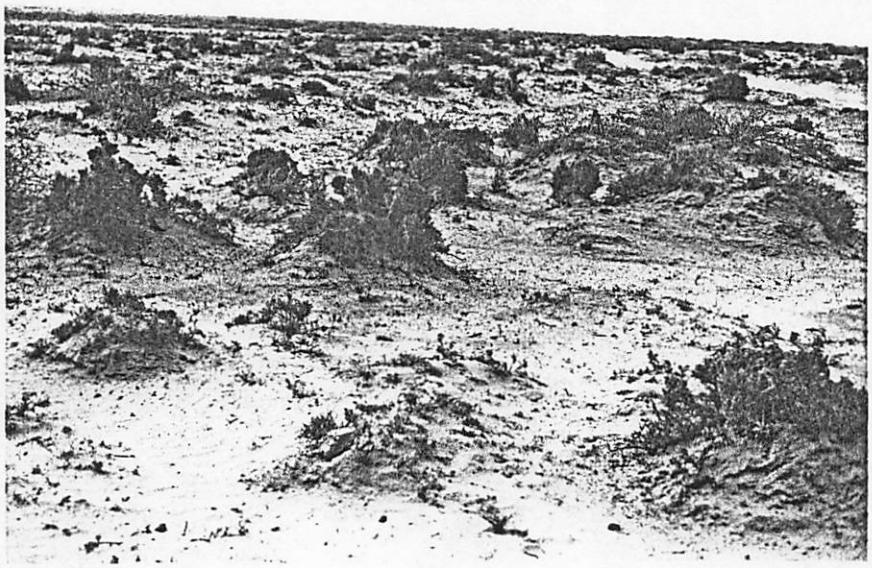

Fig. 5. Plants considerably elevated on pedastals some of which have abrupt sides. These plants have also been heavily hedged.

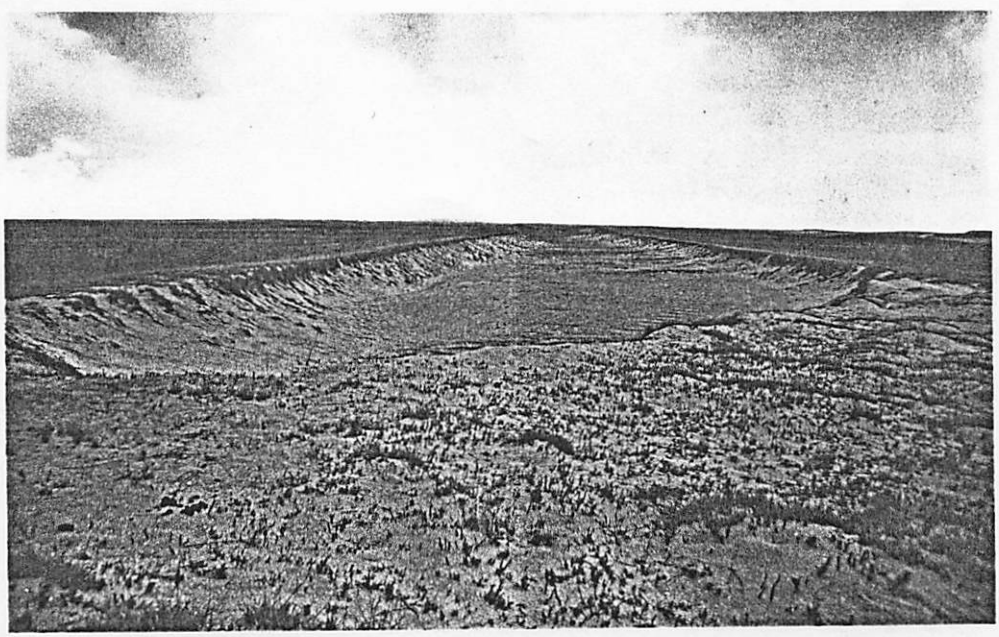

Fig. 6. A large blow out. Wind channels through the blow out excavating sand and taking it elsewhere.

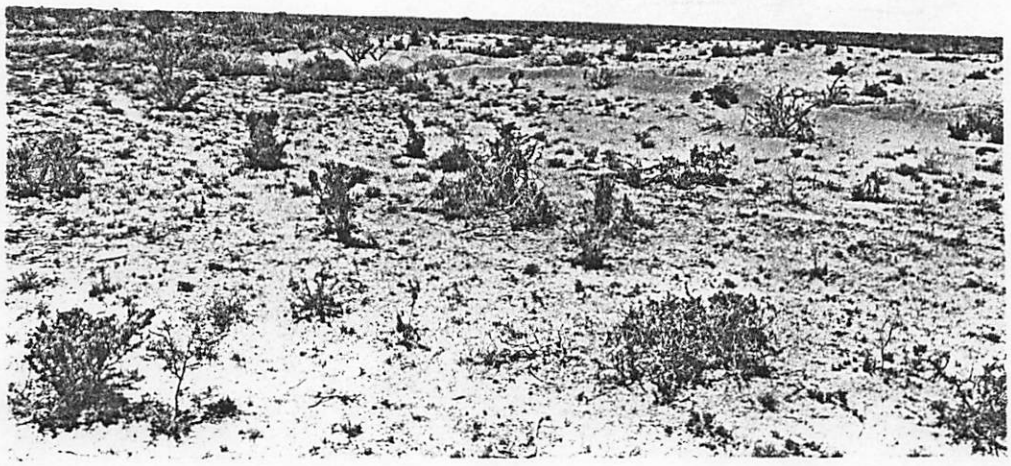

Fig. 7. A sand dune (right foreground) has formed along the fence line of a farm. It has been formed from soil blown from the cleared field.

Fig. 8. Accelerated gully erosion. Notice the steep sides of the gully and the narrowness of the cut compared with its depth.

Fig. 9. Notice the steep banks which are sometimes typical of accelerated gully erosion.

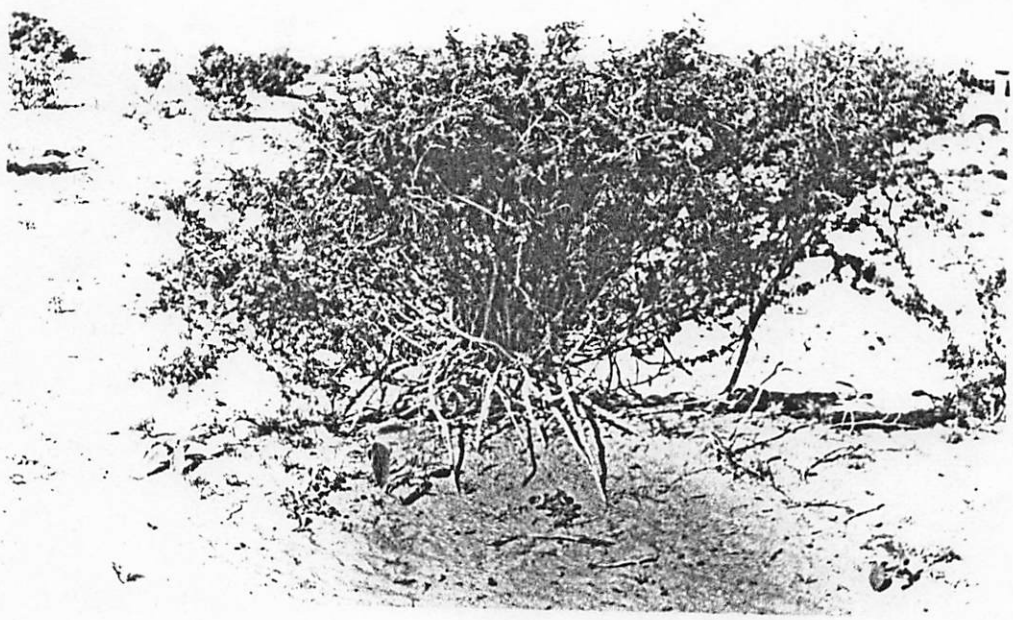

Fig. 10. Plant roots uncovered by soil erosion.

Fig. 11. Plant roots uncovered by erosion. Also note the elevated pedastal with abrupt sides.

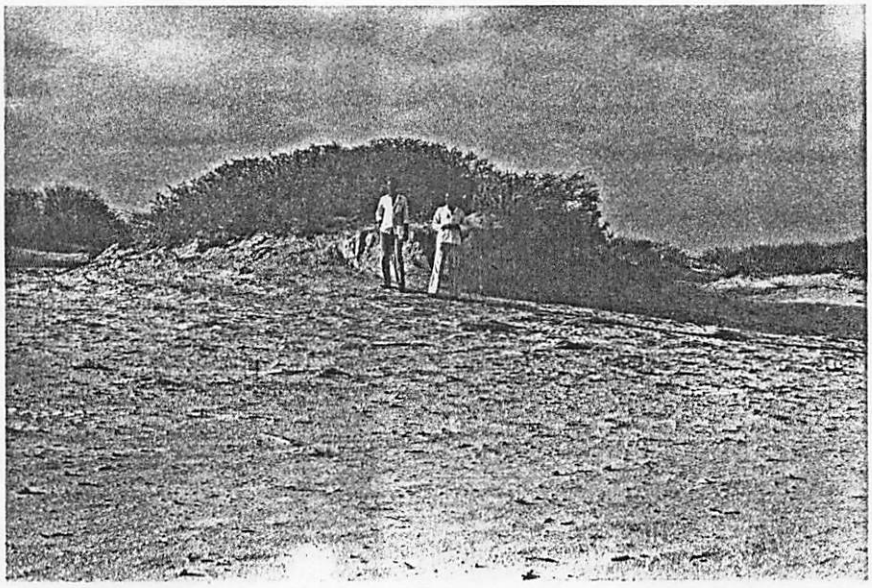

Fig. 12. A large hummock created by the accumulation of blowing sand within the shrub's crown and by removal by wind of soil between it and nearby shrubs.

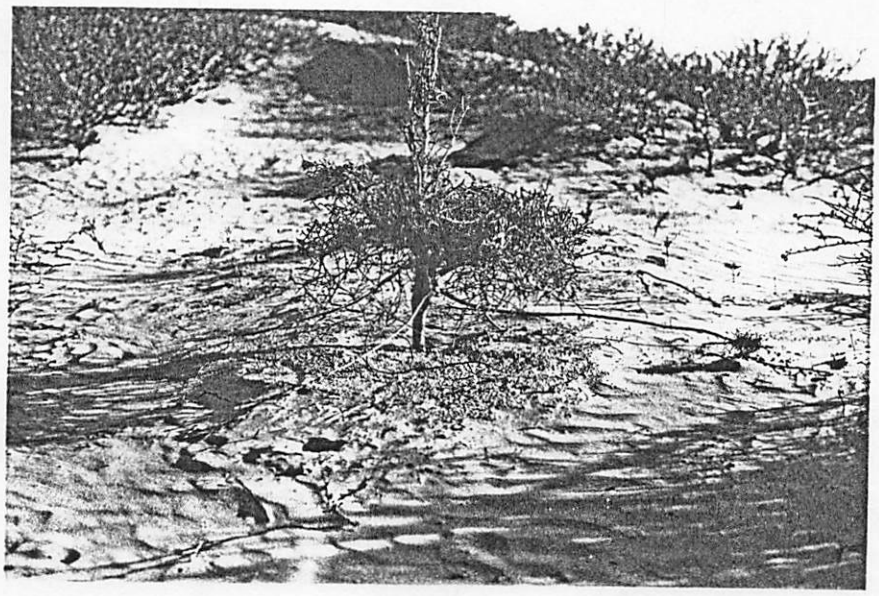

Fig. 13. A very heavily hedged shrub the roots of which have also been uncovered by soil erosion. Micro ripples are visible on the soil surface.

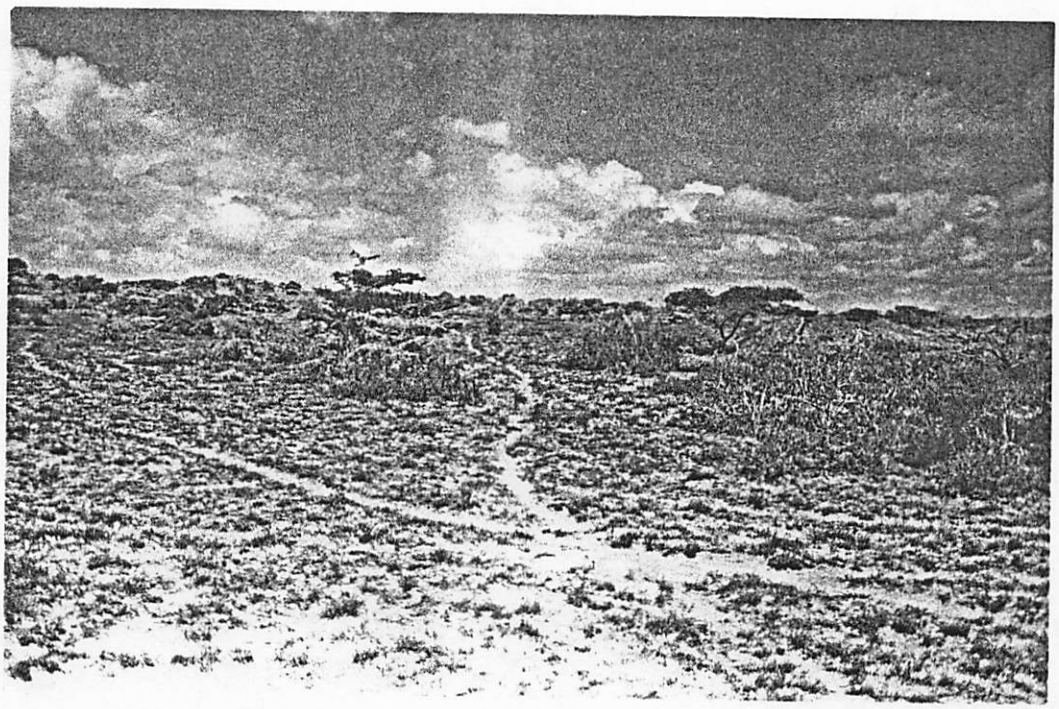

Fig. 14. Livestock trails are present.

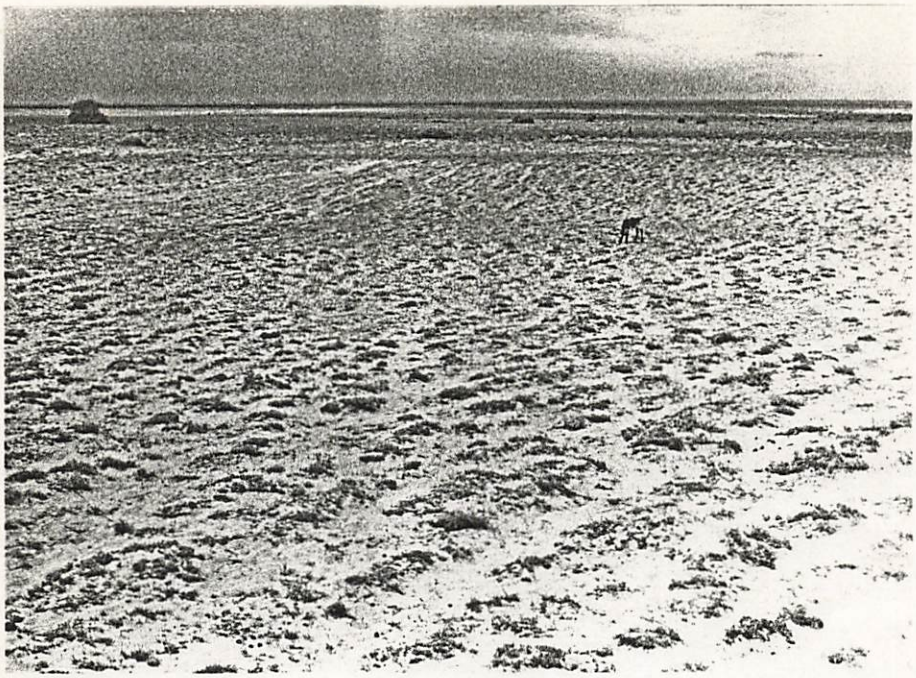

Fig. 15. This shows a situation with many livestock trails.

Fig. 16. Livestock trails are many and cut deeply into the shallow soil.

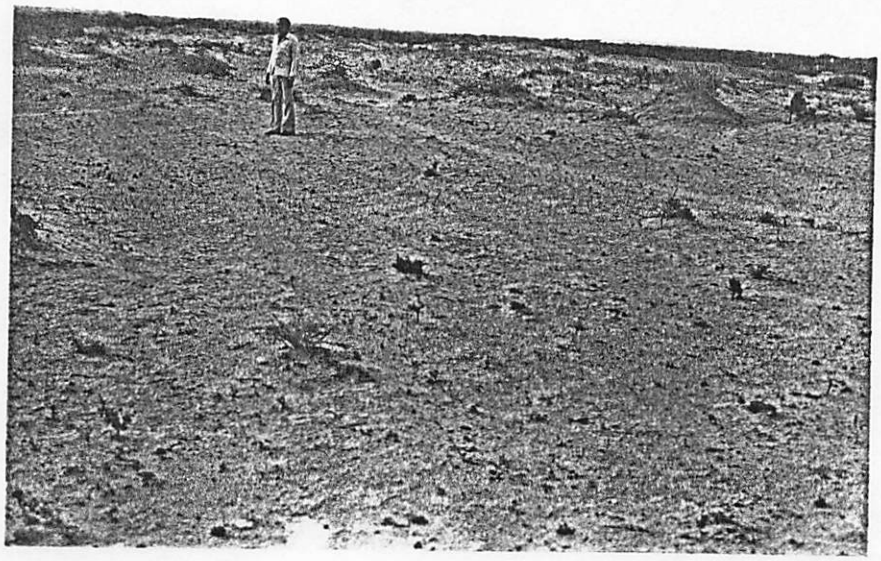

Fig. 17. This is an area where trails have coverged with the resultant loss of most of the vegetative cover.

Fig. 18. A large patch of surface crust is visible in the center of the photo.

Fig. 19. Most of the area between plants appears to be swept and packed.

Fig. 20. An example of uniformly distributed herbaceous litter.

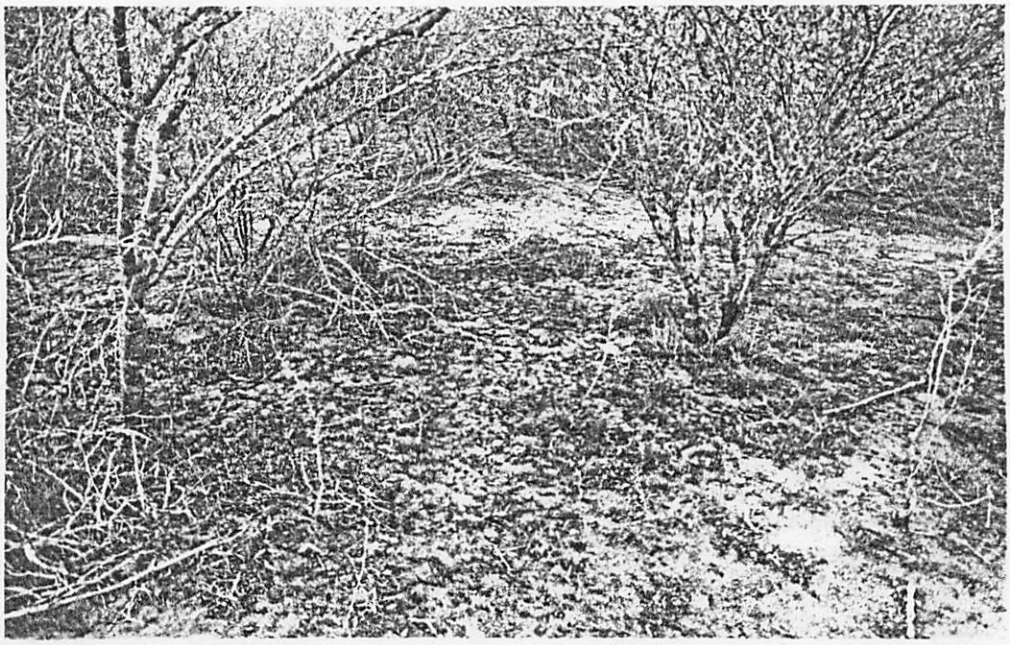

Fig. 21. Uniformly distributed herbaceous litter in a shrubland.

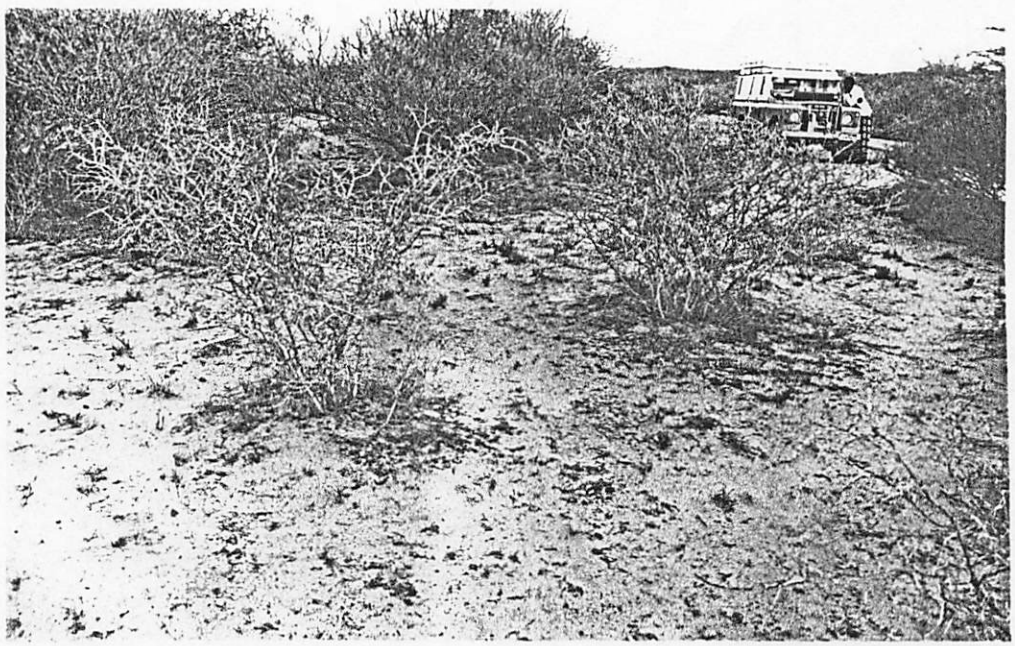

Fig. 22. Contageously distributed herbaceous litter in a shrubland.

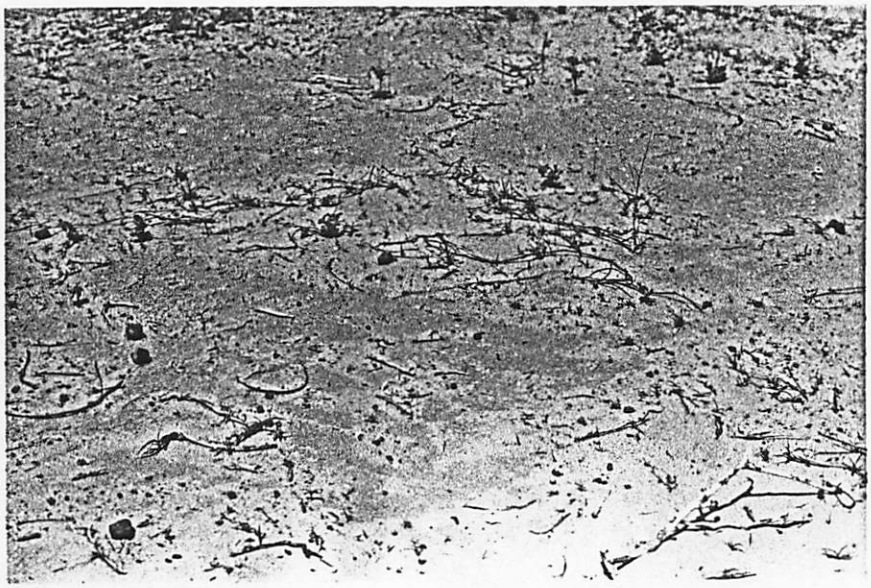

Fig. 23. This litter is uniformly distributed but is primarily woody (twigs and bits of bark).

Fig. 24. Grassland in which the bunch (tussock) grass form is obvious and dominant. Culms and leaves are abundant and tall.

Fig. 25. Bunch grass form in obvious and dominant; culms and leaves are abundant but short.

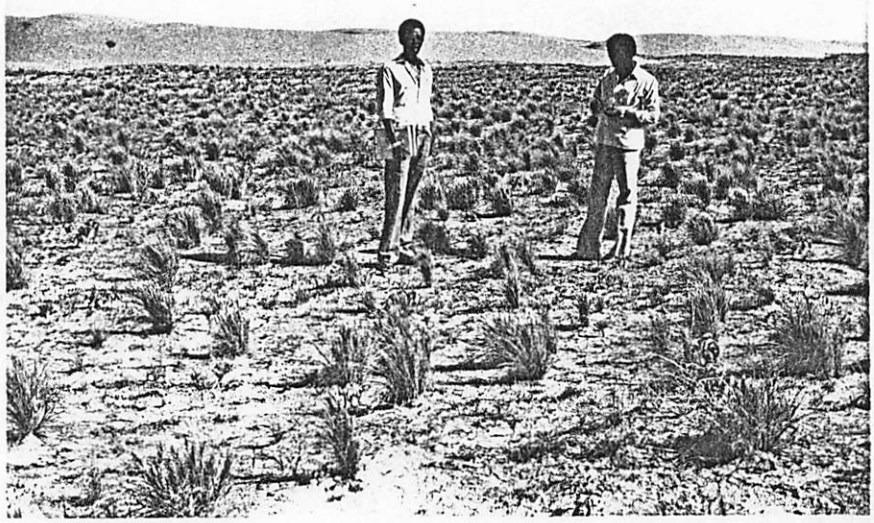

Fig. 26. The bunch grass form is obvious here but this particular species is of low palatability. The palatable bunch grasses have been grazed so heavily that they are not easily seen as such.

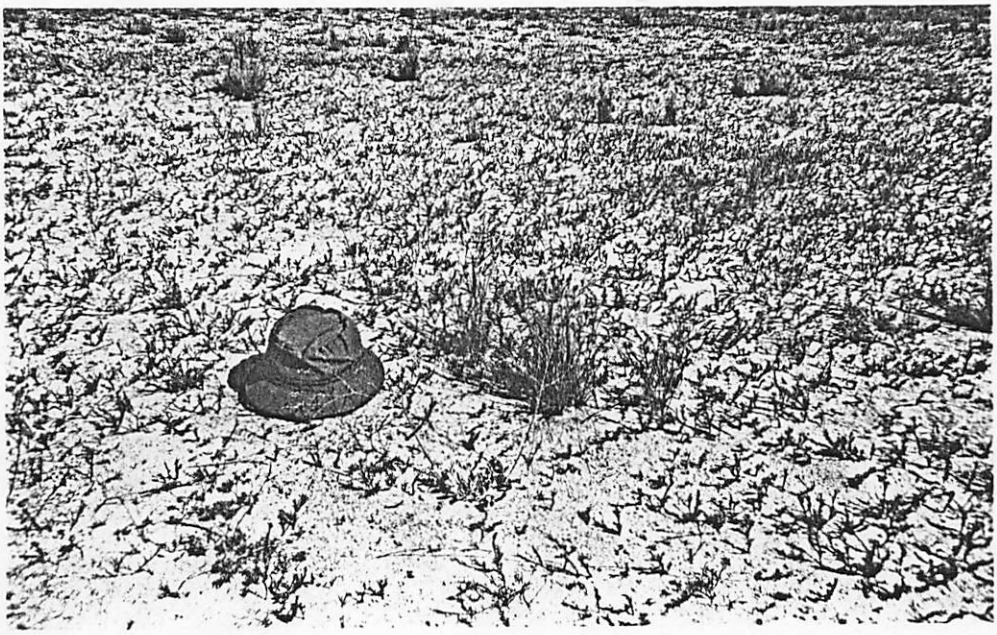

Fig. 27. Dominance here is by a low, mat forming plant; in this case a rhizomatous sedge.

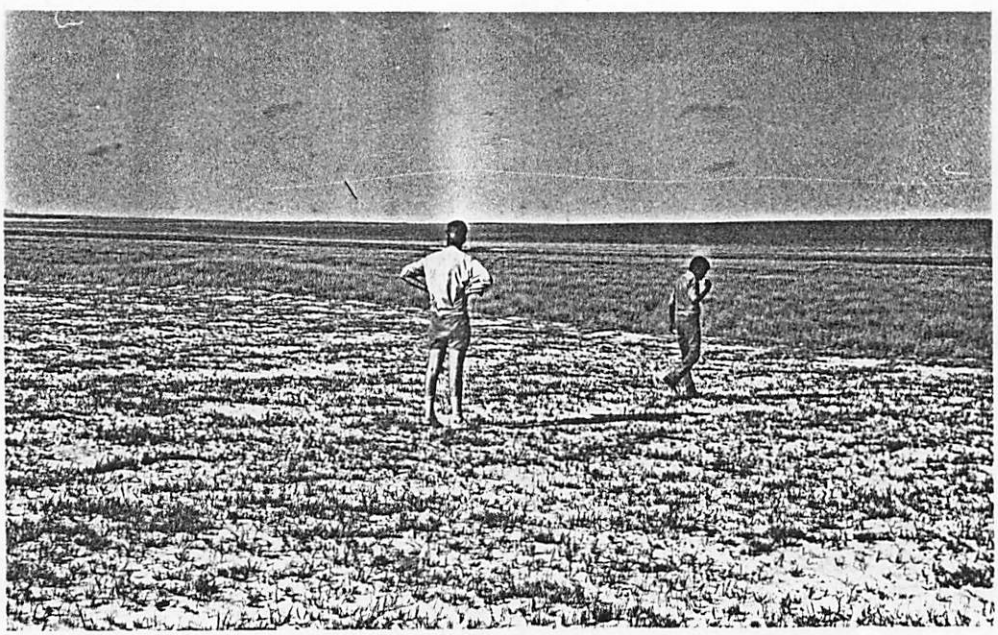

Fig. 28. The foreground is dominated by mat forming grasses and sedges. The background is dominated by bunch grasses with abundant, tall foliage.

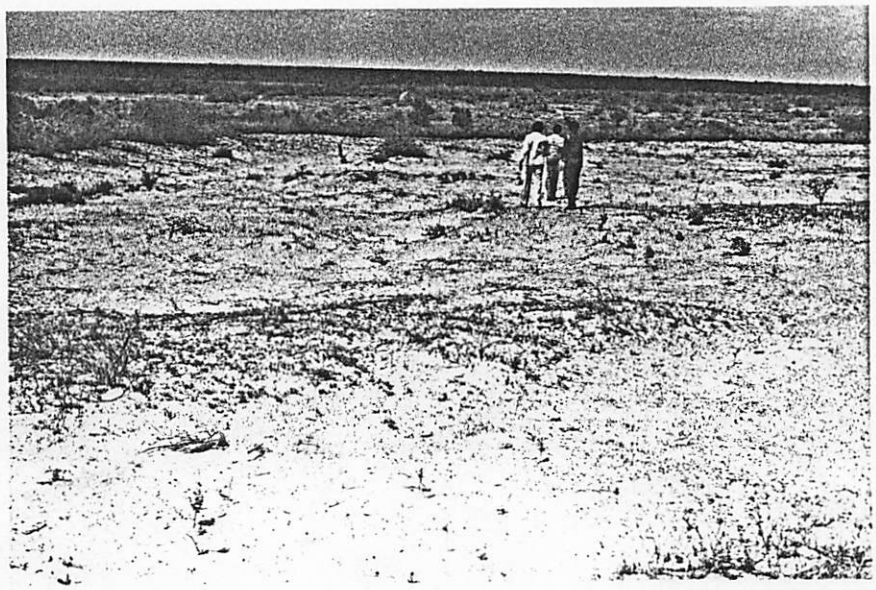

Fig. 29. A low, mat forming stoloniferous grass colonizing a recently abandoned farm.

Fig. 30. This shrub's form shows the open crown and irregularity of its surface that typifies many unbrowsed or lightly browsed shrubs.

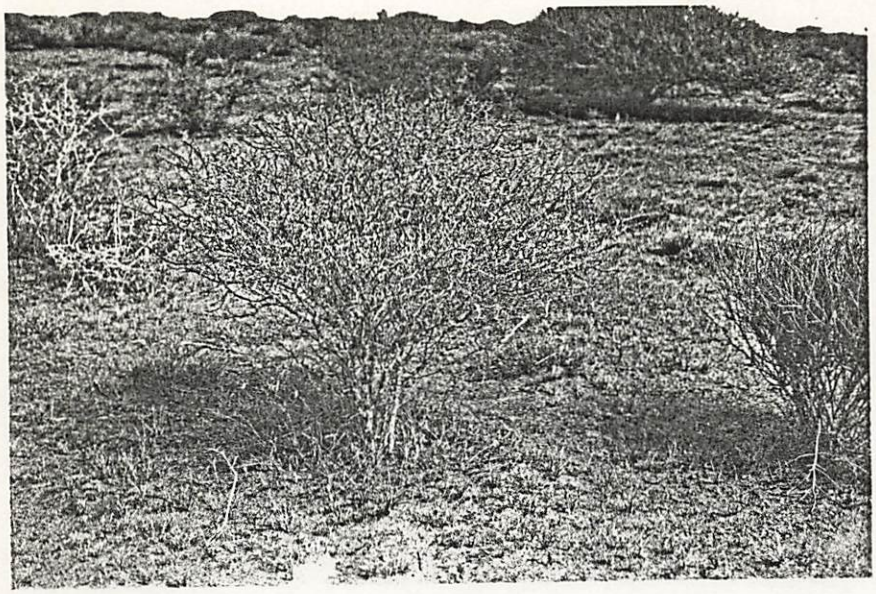

Fig. 31. The smooth, rounded crown of this shrub (Acacia horrida) shows it to be heavily hedged. Its form has been shaped by browsing.

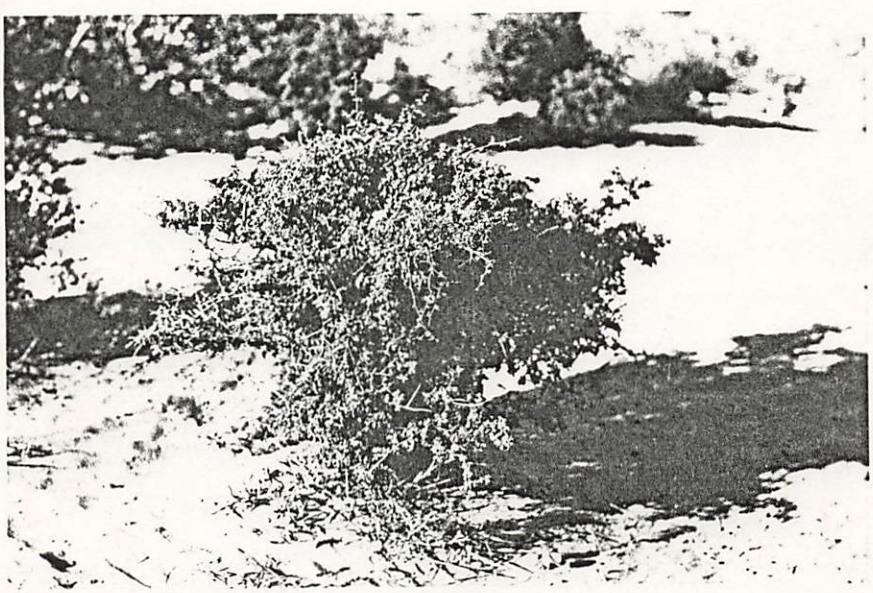

Fig. 32. A very heavily hedged shrub.

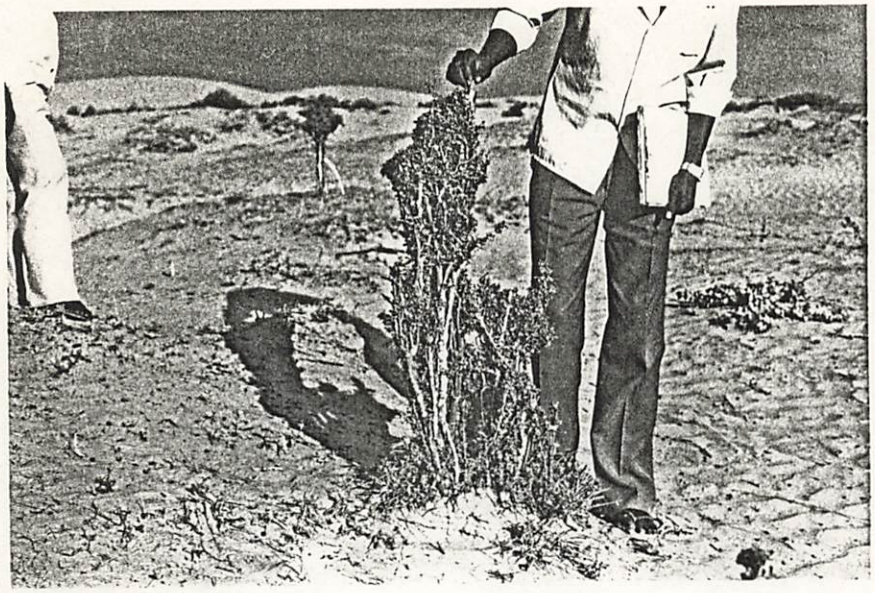

Fig. 33. A very heavily hedged shrub. This is a good example of "mounding".