SUMMARY

1- The present study deals with an ecophysiological investigation of the milky weed *Kanahia laniflora* growing naturally in Yemen.

2- Yemen is located in the northern stretches of the tropical zone with two rainfall maxima: one in april-May, the other in July-September and along dry, almost rainless period of four to five months during late autumn and winter.

3- The species concerned, *Kanahia laniflra*, inhabits various habitats including the bare rocks covering the wadi bed of the main channel of wadi Al-Ahgor (rocky habitat) to coarse wadi sediments and moistured land in mountanous region of Maareb area.

4- Soil texture, water holding capacity, moisture content are among the physical factors affecting the life of the plant. The pH of the soil was found to be moderately alkaline (7.8-8.56 and 8.07-8.11 in the rocky and coarse wadi sediments habitats respectively). The organic matter content, calcium carbonate content and aninos and cations were also determined.

5- The plant moisture content showed seasonal fluctuation owing to the seasonality of rainfall and

other climatic factors.

6- The data of plant analysis showed noticeable variations in different organs in different seasons in the plants of the two habitats.

- The highest percentage of the ash content of the leaves was attained in winter in plants of the two habitats, being 10.92% and 11.8% in the rocky and coarse wadi sediments habitats respectively, compared to 5.97% (spring) and 11.29% (winter) in the stem of plants of first and second habitat respectively. In the roots the highest percentage of the ash content (4.7 and 5.5%) in autumn in plants of rocky habitat and in summer in those of coarse wadi sediments habitat.

7- The study of the effect of habitats on metabolic products was achieved by means of studying the carbohydrate fractions, nitrogenous components and total lipid contents. The results obtained revealed that:

a) The total carbohydrate and total, direct reducing sugars as well as polysaccharides content of the different parts of *K. laniflora* varied in response to habitats during different seasons.

b) By chromatographic analysis of the free and combined sugars, glucose, fructose, sucrose and mannose were the detected free sugars while glucose, galactose, fructose, arabinose and rhamnose were the detected combined sugars in the leaves of the plants of the two habitats. In the stem the free sugars detected included glucose, galactose and sucrose while the detected combined sugars were glucose, xylose, arabinose and galactose in plants of the two habitats. For the root system of plants of the two habitats, galactose, xylose and fructose were the detected free sugars. Xylose, arabinose, fructose and galactose were the detected combined sugars.

c) The data of total nitrogen, soluble nitrogen and insoluble nitrogen content of the leaves, stems and roots of *K. laniflora* showed fluctuations during the different seasons in the two habitats. Concerning the amino acids the results revealed that the total number, total concentration as well as concentration of individual amino acids showed variation among the different parts and habitats.

d) The total lipid, acid value, iodine value and

saponification value as well as the total free fatty acids of the leaves, stems and roots of *K. laniflora* were extracted and determined. Results obtained from analysis of the fatty acids revealed that the number as well as the percentage of each individual fatty acid showed fluctuation in different plant parts in response to habitats and reached its maximum number in roots.

e) The keto acids were extracted and determined. Results obtained showed that the values of keto acids in the leaves of *Kanahia laniflora* were higher than those in stems and roots. Also it showed fluctuation between the different seasons as well as between the two habitats.

8- The study of the influence of habitat conditions on the secondary metabolic products was carried out by means of phytochemical screening of different plant organs as well as isolation and determination of certain chemical compounds from *Kanahia laniflora* collected form the two habitats. Results revealed the following:

a) The preliminary phytochemical screening of each part of *Kanahia laniflora* collected from the two habitats included the tests for carbohydrates

and/or glycosides, sterols, resins, tannins, saponins, flavonoids, cardinolides, terpens, alkaloids and chlorides and sulphates. The results obtained indicated that alkaloids were not detected in leaves, stems and roots of *K. laniflora*. Meanwhile tannins, cardinolides, sterols, resins and saponins were detected in leaves, stems and roots of plants of the two habitats. Flavonoids and terpenoids were detected in leaves but not detected in stems and roots in plants of the two habitats.

b) The percentage of crude gallotannins in leaves, stems and roots of *K. laniflora* collected from the two habitats were found to be 6.11 and 8.9% in leaves 9.9 and 11.8% in stems and 4.1 and 4.5% in roots of plants of rocky and coarse wadi sediments habitats respectively.

Chromatographic analysis of acid hydrolysates of gallotannins indicated that it consisted of gallic acid and glucose. The identity of the separated gallic acid was confirmed by means of melting point, IR, UV and mass spectroscopic analysis.

c) The percentage of crude saponins of leaves, stems and roots of plants of the two habitats

was found to be 1.95 and 1.37 g%, 0.82 and 1.01g% and 0.52 and 0.33 g% in plants of rocky and coarse wadi sediments habitats respectively. On hydrolysis of the separated saponins and by means of chromatographic investigation, galactose, glucose and fructose were detected in sugar moiety. The identity of the aglycone part was confirmed by means of chromatogrphic investigation, melting point, UV, IR and mass spectroscopic analysis. Results revealed that the separated aglycone fraction had the molecular formula $C_{27}H_{36}O_4$. Elucidation of structure of the isolated aglycone was included.

d) Three cardinolides with molecular formula $C_{32}H_{49}NO_3$, $C_{19}H_{23}NO_2$ and $C_{30}H_{42}O_8$ were separated from ethyl alcohol extract of the aerial parts of *Kanahia laniflora* The identity of these compounds was confirmed by means of micro-analysis, UV, IR and mass spectrum analysis. Elucidation of structure of these compounds was included.