

DRUG SURVEY OF WEST PAKISTAN

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(Received October 25, 1961)

An extensive drug survey of West Pakistan was undertaken to find out the quantity of drugs consumed annually by the pharmaceutical industries and to obtain statistical information on marketing. The following findings are reported: (i) The average annual consumption of the crude drugs by 40 pharmaceutical works during the year 1954-58. (ii) Detailed information about the drugs available in Peshawar, Rawalpindi, Lahore, Quetta and Sukkur markets as well as the sources of collection and their disposal is given. (iii) Names of drugs imported from Iran, Afghansitan and India and those exported to India. (iv) Lastly, the information about the methods of collection, storage and the possible adulteration is given.

Introduction

From times immemorial drugs have occupied an important position in the life of human beings and hence considerable work has been done in the past to develop them scientifically for the benefit of human race. Pharmaceutical industry is still in its infancy in Pakistan and it is important that the production and distribution of drugs and medicines at reasonable prices to the suffering masses is taken up by a well-established pharmaceutical industry. Such an industry cannot obviously be developed on imported raw materials, keeping especially in view the limited foreign exchange at the country's disposal. In order to give impetus to this very important industry, the drug resources of the country must be fully explored and developed. There are more than eighty pharmaceutical units working in its both wings. Most of them manufacture simple preparations. They feel handicapped in obtaining the right type of raw material of botanical origin for production and in consequence they have to import concentrates from foreign countries which in the last analysis tend to raise the cost of finished preparations beyond the reach of the common man.

On the establishment of the Indigenous Drugs Research Division at the North Regional Laboratories of the Pakistan Council of Scientific and Industrial Research, it was considered essential that before undertaking advanced scientific investigations on medicinal plants, a large number of which are indigenous to Pakistan, the drug requirements of the country should be assessed properly and the available quantities made known. With this object in view, an extensive survey of West Pakistan was undertaken to find out the quantities of drugs consumed annually by pharmaceutical industries, and to obtain statistical information on marketing. The average annual consumption of the crude drugs by 40 pharmaceutical works has been worked out from the data

collected during the years 1954 to 1958 and is given in Table 1.

TABLE 1.—AVERAGE ANNUAL CONSUMPTION OF CRUDE DRUGS BY PHARMACEUTICAL INDUSTRIES IN PAKISTAN.

Name of drug	Average annual consumption in mds.	Remarks
<i>Ephedra</i> ..	26,000	Baluchistan Ephedra is only used by Marker Alkaloids, Quetta, and also exported
<i>Glycyrrhizae radix</i> ..	2,500	Imported
<i>Santonica</i> ..	2,000	Only Kurrum <i>Artemesia</i> is used by Kurrum Chemical Works, Rawalpindi
<i>Acaciae gummi</i> ..	365	Major part imported
<i>Hyoscyamii folia</i> ..	350	Imported, small quantities obtained from local markets
<i>Aurantii amari cortex</i>	125	Obtained from local markets
<i>Olea resina pini</i> ..	125 Galls.	" " " "
<i>Senegae radix</i> ..	105	" " " "
<i>Zingiberis rhizoma</i> ..	100	Imported, seldom purchased from local markets
<i>Belladonnae radix</i> ..	90	Obtained from local markets
<i>Gentianae radix</i> ..	85	Mostly imported
<i>Belladonnae herba</i> ..	80	Obtained from local markets
<i>Stramoni folia</i> ..	80	" " " "
<i>Valerianae rhizoma</i>	65	" " " "
<i>Camphora</i> ..	60	Imported
<i>Anethi fructus</i> ..	55	Obtained from local markets

<i>Colchi cornus</i>	..	50	Obtained from local markets
<i>Anisi feuctus</i>	..	45	Imported
<i>Cauri fructus</i>	..	40	Obtained from local markets
<i>Rhei rhizoma</i>	..	40	„ „ „ „
<i>Sarsaparillae radix</i>		40	Imported
<i>Catechu</i>	..	35	„
<i>Lemonis cortex</i>	..	30	Obtained from local markets
<i>Coriandri fructus</i>	..	25	„ „ „ „
<i>Digitalis folia</i>	..	25	Imported
<i>Ispaghula semina</i>	..	25	Obtained from local markets
<i>Colocynthides fructus</i>		20	„ „ „ „
<i>Herba menthae piperitae</i>		20	Obtained from local markets, most of the requirements are imported in the form of extracts
<i>Scillae bulbus</i>	..	20	Imported
<i>Traganthae gummi</i>		20	„
<i>Aconiti radix</i>	..	15	Mostly imported
<i>Aloe</i>	..	15	Imported
<i>Colchici semen</i>	..	15	Obtained from local markets
<i>Opium</i>	..	15	Mostly imported
<i>Foeniculi fructus</i>	..	15	Obtained from local markets
<i>Podophylli rhizome</i>		15	„ „ „ „
<i>Curcuma rhizoma</i>	..	2	„ „ „ „

From Table 1 it will appear that many of the pharmacopoeial drugs, for example, *Cassiae fistulae fructus*, *Filicis rhizome*, *Herba menthae virides*, *Iridis rhizoma*, *Juniperi fructus*, *Lini semina*, *Psyllium semen*, *Ricini semina*, *Sannae folium*, and *Sannae fructus*, are not being utilised at all by the industry, where as they grow in abundance. Many of the drugs e.g., *Aconiti radix*, *Belladonnae radix*, *Gentianae radix* and *Scillae bulbus*, have been imported, though indigenously available.

Drug Markets

A wide range of the herbs used in the pharmacopoeial and Unani systems of medicine are found in wild state in the northern and western parts of West Pakistan. They are collected by the local inhabitants and brought to the towns from where they are forwarded to the different centres of marketing. These centres are Peshawar, Rawalpindi, Lahore, Quetta and Sukkur. Detailed information about these centres are given as follows:—

Peshawar.—A few drugs like *Peganum harmala*, *Baucerosia aucheriana*, *Mentha longifolia*, *Fumaria parviflora*, *Citrus colocynthis* and *Cassia fistula*, are collected locally from Peshawar or its suburbs. Other drugs like root of *Berberis Lyeium*, fruit of *Zizyphus vulgaris*, corm of *Orchis latifolia*, flowers of *Viola serpens*, root of *Paeonia emodi* and *Punica granatum* and leaves of *Hyoscyamus niger* are brought from Swat and Dir; root of *Polygala chinensis* from Mardan; and herb of *Seuda fruticossa* and *Salsola foetida*, fruits of *Plantago ovata* and *Citrullus colocynthis* from Kohat, Bannu and D. I. Khan. A number of medicinal plants i.e. *Coriandrum sativum*, *Cuminum cyminum*, *Papaver somniferum* and *Foeniculum vulgare* are cultivated locally and are brought by the cultivators to the drug market of Peshawar.

Rawalpindi.—A number of drugs collected from different localities are forwarded to this market during the months of September-November and April-May. The main sources of collection and consumers of these drugs are listed in Table 2.

TABLE 2.—MAIN SOURCES OF COLLECTION AND CONSUMERS OF DRUGS AT RAWALPINDI CENTRE.

Name of drug	Sources of collection	Disposal of drug
<i>Acacia arabica</i> (gum)	Wholesalers at Karachi & Lahore	Pharmaceutical labs., ink manufacturers, hakims & stationers
<i>Acacia catechu</i> , (extract)	Wholesalers at Lahore	Pharmaceutical labs., betel dealers and consumers
<i>Achillea millefolium</i> , (flowers)	Drug merchants, Quetta	Hakims
<i>Achyranthes aspera</i> , (herb)	Collected locally by villagers	Small quantities to Hakims
<i>Aconitum heterophyllum</i> , (roots)	Collected by migrants of Azad Kashmir	„ „
<i>Acorus calamus</i> (rhizomes)	Wholesalers of Lahore	Hakims
<i>Adiantum capill-veneris</i> (fronds)	Swat, Dir & Murree Hills	Consumed in sufficient quantities by Hakims
<i>Adhatoda vasica</i> , (leaves)	Lower hills of Murree	Small quantities to hakims and major part forwarded to Lahore
<i>Areca catechu</i> , (nuts)	Purchased from Karachi	Supplied to the betel consumers

<i>Artemisia maritima</i> , (buds)	Collected from Dir Swat, & Chitral supplied from Nowshera & Peshwar	Supplied to hakims	<i>Juniper macropoda</i> , (berries)	Purchased from Lahore market	Small quantities consumed by hakims
<i>Asparagus recemosus</i> , (roots)	Collected from Hazara and Azad Kashmir	Supplied to hakims	<i>Lawsonia alba</i> (leaves)	Purchased from cultivators at Gujranwala	Consumed for hand dyeing
<i>Atropa acuminata</i> , (leaves & roots)	Indus Kohistan	Pharmaceutical industries	<i>Mallous philippinensis</i> , (fruits)	Imported from India	Used by hakims
<i>Berberis lycium</i> , (roots)	Murree, Swat, Dir & Azad Kashmir	Unani dawakhanas for extraction of 'Rasaunt'	<i>Mentha piperita</i> , (fruits)	Cultivated locally	Forwarded to Lahore and Karachi. Small quantity supplied to hakims.
<i>Cassia fistula</i> , (fruits)	Collected locally	Small quantities to hakims	<i>Myrsine africana</i> , (fruits)	Murree Hills, Hazara and Swat	Forwarded to Lahore and Karachi. Small quantity supplied to hakims
<i>Citrus colocynthis</i> (fruits)	Collected locally	Small quantities to hakims	<i>Paeonia emodi</i> , (roots)	Azad Kashmir, Hazara and Dir	Consumed by hakims and forwarded to Lahore and Karachi
<i>Colchicum luteum</i> , (corms)	Hazara and Murree; also purchased from Peshawar market	Hakims & pharm. Ind., forwarded to Lahore and Karachi	<i>Peganum hermaia</i> , (seeds)	Peshawar market and Rawalpindi	Consumed by hakims
<i>Coriandrum sativum</i> , (fruits)	From locally cultivated crops	Consumed locally as spice	<i>Phyllanthus emblica</i> , (fruits)	Purchased from Lahore market	" "
<i>Cuminum cymimum</i> , (fruits)	From locally cultivated crops	Consumed locally as spice	<i>Plantago ovata</i> , (seeds)	Peshawar market and collected locally	Hakims, forwarded to Lahore
<i>Curcuma longa</i> , (rhizomes)	Purchased from Lahore & Haripur	Small quantity to pharmacies, major part consumed as spice locally. Cheap variety from Haripur is forwarded to Lahore & Karachi	<i>Punica granatum</i> , (bark & cortex and seeds)	Peshawar reduce market Imported from Afghanistan	Forwarded to Lahore
<i>Cuscuta reflexa</i> , (stems)	Collected locally, thin variety is purchased from Quetta	Consumed by hakims	<i>Rhazya stricta</i> , (roots)	Small quantities from Peshawar	Consumed by hakims
<i>Datura stramonium</i> , (leaves & seeds)	Lower hills of Azad Kashmir, Hazara and Murree	Pharm. ind., major part forwarded to Lahore & Karachi	<i>Rheum emodi</i> , (roots)	Dir and Swat	Pharm. ind.
<i>Ferula foetida</i> , (Resin)	Purchased from Peshawar market	Consumed by hakims	<i>Saevda fruticosa</i> , (herb)	Sukkur market	Consumed by hakims
<i>Fumaria parviflora</i> , (herb)	Collected locally	Consumed by hakims	<i>Swertia chirata</i> , (stems)	Murree Hills, Dir, Swat and Hazara	" " "
<i>Gentiana kurroo</i> , (roots)	Collected from lower hills of Murree & Hazara, also forwarded from Nowshera market	Small quantities to pharm. ind., major part of forwarded to Lahore and Karachi	<i>Terminalia chebullo</i> , (fruits)	Lahore market	" " "
<i>Geranium wallichianum</i> , (roots)	Forwarded by Peshawar market. Collected from Murree & Azad Kashmir	Consumed as spice; small quantities consumed by hakims	<i>Thymus serpyllum</i> (leaves)	Quetta market	" " "
<i>Glycyrrhiza glabra</i> , (roots)	Imported from Afghanistan & forwarded from Peshawar and Quetta	Pharm. labs. and hakims	<i>Valeriana wallichii</i> (roots)	Dir, Swat, Hazara and Murree Hills	Small quantities by pharm. ind.
<i>Ipomoea hederaceae</i> , (seeds)	Collected locally	Small quantities consumed by hakims	<i>Viola serpens</i> , (flowers & leaves)	Dir, Swat, Hazara and Murree Hills	Small quantities consumed by hakims. Major part forwarded to Lahore
<i>Juglens regia</i> , (bark)	Collected from Dir, Swat, Hazara and Azad Kashmir	Consumed for cleaning teeth. Forwarded to Lahore and Karachi	<i>Withania coagulans</i> , (fruits)	Peshawar market	Small quantities consumed locally, forwarded to Lahore

Lahore.—The drugs listed in Table 3 are collected at the markets of Quetta, Hyderabad and Sukkur and are forwarded to Lahore.

TABLE 3.

Name of drug	Forwarding market		
<i>Juniperus macropoda</i> (Berries)	Quetta
<i>Hyoscyamus niger</i> (Leaves)	"
<i>Thymus serpyllum</i> (Leaves)	"

<i>Achillea millefolium</i> (Flowers)	--	--	..	
<i>Acacia catechu</i> (Extract)	--	--	..	Karachi
<i>Areca catechu</i> (Nuts)	--	--	..	..
<i>Phyllanthus emblica</i> (Fruits)	..	..	..	..
<i>Ricinus communis</i> (Seeds)	..	..	..	Quetta & Sukkur
<i>Acacia arabica</i> (Gum)	..	..	..	Hyderabad & Sukkur
<i>Cuscuta reflexa</i> (Stem)	--	..	..	Sukkur & Quetta
<i>Sueda fruticosa</i> (Herb)	--	..	..	Sukkur

Most of the drugs used by the Lahore manufacturers are purchased locally except *Camphora*, *Digitalis*, *Sarsaparella* and *Catechu*, which are imported directly from Germany, England and India, respectively.

Quetta.—The important drugs found in Quetta and Kalat Divisions, e.g., *Ephedra*, *Juniper berries*, *Glycyrrhiza*, *Asafoetida*, are under the control of the Government. Quantities of the *Ephedra* collected and disposed of during the years 1954-58 are given in Table 4.

TABLE 4.*

Year	Qty. collected in mds.	Qty. of different grades disposed of in mds.	(a)	(b)	(c)
1954 ..	21858	6267			11379
1955 ..	26961	23212			3328
1956 ..	28339	17528			2256
1957 ..	20660	15918			2407
1958 ..	37023	2580			21739

* Data supplied by the Conservator of Forests, Quetta and Kalat Circle.

In 1958, the Conservator of Forests, Quetta and Kalat Circle, collected about 1686 maunds of juniper berries.

The Conservator of Forests, Quetta advises that the collection of a number of herbs, e.g., *Carum bulbocastanum*, *Ferula asafoetida*, *Hyoscyamus niger*, *Hyoscyamus reticulatus*, *Olea cuspidata* and *Thymus serpyllum* etc., can be undertaken by the Department.

Sukkur and Karachi.—Most of the drugs collected at the Quetta market are forwarded to the markets of Sukkur and Karachi. Only a

few drugs, i.e., *Plantago ovata*, *Acacia arabica*, *Cassia augustifolia* and *Citrullus colocynthis* etc., collected from Khairpur and Bahawalpur areas are brought into the market of Sukkur.

The following drugs are imported in West Pakistan from Iran and Afghanistan:—

<i>Ferula foetida</i> (Resin)	<i>Punica granatum</i> (Cortex)
<i>Glycyrrhiza glabra</i> (Roots)	<i>Zizyphus vulgaris</i>
<i>Rosa damascena</i>	<i>Vitis vinifera</i> (Dried fruits)
<i>Berberis vulgaris</i> , (Roots)	<i>Carum bulbocastanum</i>

It may be mentioned here that as these drugs are collected from different localities in small quantities by the itinerant tribes while coming down to Pakistan, their quality varies very much. Drugs such as *Achillea millefolium*, *Anacyclus pyrethrum*, *Astragalus gamifer*, *Crocus sativus*, etc., are brought in this way from Iran.

The following drugs are imported from India:—

- Arbus precatorius* (Seeds)
- Acacia catechu* (Extract)
- Acorus calamus* (Roots)
- Aegle marmelos* (Fruits)
- Anacardium occidentale* (Fruit)
- Areca catechu* (Nuts)
- Cassia latifolia* (Oil)
- Carica papaya* (Fruit pulp)
- Croton tiglium* (Seeds)
- Curcuma longa* (Roots)
- Curcuma zedoria* (Roots)
- Hollarrhena antidysenterica* (Bark)
- Mallotus philippinensis* (Fruit)
- Ocimum sanctum* (Seeds)
- Phyllanthus emblica* (Fruits)
- Rauwolfia canescens* (Roots)
- Rauwolfia serpentina* (Roots)
- Sapindus trifoliatus* (Fruits)
- Saraca indica*
- Semecarpus anacardium* (Fruits)
- Sesamum indicum* (Seeds)
- Termenalia belerivoca* (Fruits)
- Tamarindus indica* (Fruits)
- Zingiber officinale* (Roots)

At Karachi a number of drugs, i.e., *Acacia catechu*, *Apium graveolens*, *Curcuma longa*, *Asteracantha longifolia*, *Bacopa mounieri*, *Caesalpinia bonducella*,

Aleteria cardamomum, *Holarrhina antidysenterica*, *Pterocarpus marsupium* and *Rauwolfia serpentina* etc., are imported from Bombay.

Export of Drugs from West Pakistan

The following drugs are collected at Lahore from different markets of Pakistan and exported to India through Wagah border:—

Juniper berries	<i>Viola serpens</i>
<i>Glycyrrhiza glabra</i>	<i>Plantago ovata</i>
<i>Carum bulbocastanum</i>	<i>Cassia fistula</i>
<i>Citrullus colocynthis</i>	<i>Ephedra Sp.</i>
<i>Angelica glanca</i>	<i>Ajuga bracteosa</i>
<i>Asparagus adcondense</i>	<i>Balsamodendron mukul</i>
<i>Gentiana Kurroo</i>	<i>Geranium wallichianum</i>
<i>Juglens regia</i> bark	<i>Myrsine africana</i>
<i>Asafoetida</i>	

Methods of Collection and Storage

From the time of collection up to the final disposal of the drug no processing is done except in the case of *Colchicum* corms. The corms of *Colchicum* after collection are washed, boiled and dried in the sun. In the process the starch in the corms is coagulated, preventing the corms from disfiguring and shrinking in the process of drying. The unshrunk ivory-like corms are held in favour by the Hakims. On the other hand the percentage of the alkaloid, colchicine, which is soluble in water is decreased and some fraction of it is decomposed into colchicane. Thus, some part of the useful alkaloid is lost during this process. Such corms are probably preferred by the Hakims due to the very small quantity of the poisonous alkaloid. But from the industrial and pharmaceutical point of view these corms are of no use. The drug-stock with the Pansari is always a mixture of the stuff collected from different localities, aspects and altitudes which vary very much in their chemical contents.

Adulteration

On examination of some samples with collectors, Pansaries and other drug dealers, *Viola* flowers were found mixed with the flowers of *Impatiens*, its leaves with leaves of *Valeriana*; corms of *Colchicum* with corms of *Merender* and *Tulip*; *Hyoscyamus* leaves with that of *Datura*; *Gum arabic*, with gums from the different species of *Acacia* and *Albizzia*, etc., fruit of *Carum bulbocastanum* with fruits of *Bupleurum* sp. It was also observed that sometimes a number of different items are sold under the same name. It has been reported (Schemimer, Dymock) that the flowers of *Coccinia glavea*, *Onosma macrocephala*, *Anchusa italica*, *Anchusa*

hybrida, and *Trichodesma molle* has also been supplied under this name. It was observed that flowers of *Trichodesma indicum*, R. W. in Baluchistan, flowers of *Trichodesma zeylanicum* in Sind, flowers of *Onosma echioides* and *Macrotomia benthemia* in Punjab, are sold under the same name. There are a dozen substitutes for the leaves known as "Berg-e-Gao-Zaban". It thus appears that "Gul-e-Gao-Zaban" or "Berg-e-Gao-Zaban" is a generic name applied to the blue flowers of several plants of the *Boraginaceae* family; but the efficacy of the adulterated or substituted drug becomes doubtful. Sometimes sand, soil and stones are also added to increase the weight of the drugs. For example, *asafoetida* is adulterated with fragments of vegetable tissue, red clay, sand etc.

Conclusions

This survey reveals that a large number of medicinal plants is available in the country in quantity. But the quantities exploited in the pharmaceutical industries are negligible, leading to the waste of bulk of this natural commodity. On the other hand, there is good scope for their commercial exploitation in and outside the country. Indigenous drugs do not attract local and foreign consumers due to their poor quality, irregular supplies and adulteration. The ignorance of the local dealers and manufacturers about the availability of some drugs in this country results in the export of some of the drugs on cheaper rates, and reimport of the same on much higher prices.

To remedy the above situation, it is suggested that:

1. A quantitative survey of the medicinal plants in the country should be undertaken to know the exact quantities of the medicinal plants available for commercial exploitation.
2. Drugs which are not found in the country or are available in small quantities should be cultivated at suitable places.
3. Drugs collected for export purposes should be checked for their quality before they are allowed to be shipped.
4. Pharmaceutical industries should be encouraged to prefer the indigenous drugs to the imported extracts. The imports of the extracts of the plants or the drugs which are found in the country should be restricted or totally stopped.
5. Preparations recognised in the United States Pharmacopoeia and the India Pharmacopoeial Code may be introduced in the country

which will bring more drugs in use by the pharmaceutical industry.

6. Some organisation may be set up by the Government in cooperation with the collectors and consumers of the drugs for the collection, processing and storing of the drugs under scientific methods and finally disposing of the stocks to the consumers in and outside the country. This will assure the collectors of the disposal of their collection at reasonable rate and the consumers of the supply of their requirement of the standard quality of the drugs. The quality of the drugs will also be improved through proper supervision of the methods of collection and drying.

Acknowledgements

I am very much indebted to Colonel M.K. Afridi and Dr. M. O. Ghani, former Directors of the North Regional Laboratories for their keen interest, continuous encouragement and facilities without which it would not have been possible to complete this laborious task. My thanks are also due to the drug dealers and industrialists for their unstinted co-operation in providing me the necessary information and for their courtesy during my visits to their stores or laboratories. I am also grateful to the Director of Industries, West Pakistan for providing me with a list of pharmaceutical industries and the Conservator of Forests, Quetta, for information on the drugs collected by this Department.