

Desert Locust Joint Border Survey in Spring Breeding Area of I.R.Iran and Pakistan

April – May 1998

By:
M. Ghaemian
Dr. I.H. Pathan
M.Z. Rajabi
K.A. Syed

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(1) under separate cover, part 2

(2) under separate cover, part 3

Summary and Recommendation

1. The joint survey of the desert areas of the Province of Sistan and Baluchistan in south eastern Iran and Baluchistan of Pakistan was carried out during 18 April - 18 May 1998 for the fourth consecutive year. This year the survey team traveled a distance of 8389 Km.
2. Based on the recommendations of the first joint survey 17 days were spent on survey in Pakistan due to the bad condition of roads in that country and the rest of the survey period was spent in Iran.
3. Two experts from Islamic Republic of Iran and two from Pakistan participated in the joint survey. They were provided with four cars and drivers in each country. For the first time a maintenance assistant joined the team of I.R.Iran greatly facilitating the their tasks.
4. The survey casts were borne by FAO.
5. To achieve the main objective of the team being the survey of potential locust breeding areas with previous infestations local experts and, where necessary, native people and shepherds joined the team.
6. New areas in I.R. Iran have been proposed for the next survey provided suitable vehicles will be available. Difficult working conditions require the vehicles to be in good shape with at least two of them air-conditioned.
7. Since many reports on desert locusts in the southern areas of Iran have been received during the current year the team proposes that "Baluchistan" be removed from the title of the joint survey to mean that egg laying during spring is not limited to the Baluchistan region. The proposed title for the survey will read as follows: **Joint Desert Locust Survey of the Winter-Spring Breeding Areas of the I.R.Iran and Pakistan.**
8. The team used a laptop for recording information during scouting, which proved to be very useful. It belongs to the Plant Protection Organization and is proposed to be used during the next survey.
9. During the current year survey in a number of areas was tentatively carried out by two teams each consisting of an Iranian and a Pakistani expert making survey of more areas possible. This experiment proved quite effective. It is proposed to be used for more areas during the survey of next year.
10. Baluchistan of Pakistan received less rainfall compared to Baluchistan of Iran this year. Rainfall started earlier and ended later than usual. It may be said that this year the wet season lasted longer in the Iranian side compared to last year. More importantly, the trend of rainfall was more

consistent compared to last year which resulted in a longer duration of vegetation in the region.

The locust situation in Pakistan was generally calm due to little rainfall. Only Sorvan in Panjgur area, Shooli in Turbat area and Gorani Chah in Pasni area need continuous surveillance.

Kurehay-e-memari in Iranshahr, Poshti and Beris areas in Chahbahar in Baluchistan of Iran needed control, which was started immediately. Surveillance of these areas may become necessary upon completion of the control operations in view of the possible escapees.

- 11.** This year a member of the Iranian team got malaria. Taking malaria pills and mosquito net are recommended for the next year survey.

Acknowledgements

The joint survey team is very thankful of the plant protection authorities of I.R.Iran and Pakistan for making the arrangements and coordination for a successful survey. The team also acknowledges the FAO Headquarters in Rome as well as the Offices of the FAO Representative in Iran and Pakistan for their unsparing cooperation.

Both Iranian and Pakistani members of the team will never forget the comprehensive supports of Mr. Vakili, Director of the Plant Protection Organization of I.R. Iran. The team believes that without Mr. Vakili`s support the survey would face difficulties and would be left incomplete.

Joint Desert Locust Survey of the Winter-Spring Breeding Areas of the I.R.Iran and Pakistan April - May 1998

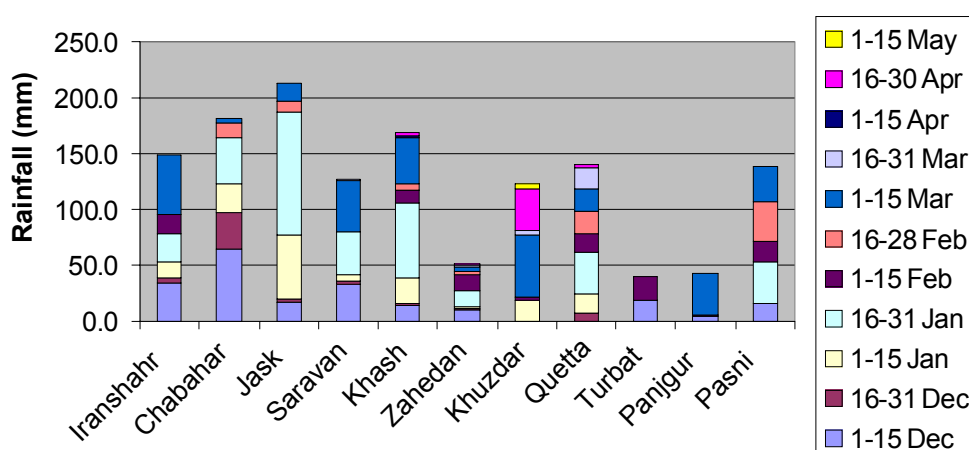
Introduction

This is the fourth of the surveys recommended by the Nineteenth Session of the Commission for Controlling the Desert Locust in the Eastern Region of its Distribution Area in Southwest Asia in 1994.

Having been started in 1995 the survey activity improved year by year using recommendations of the previous survey teams. Usefulness of the survey in view of its results and early warnings by the team is quite tangible. A gregarious swarm in Shooli area in Pakistan, copulating locusts in Iranshahr area and pupae forming group in Vashnam in Chahbahar area reported by the team as well as the locust situation forecast for the eastern coasts of Chahbahar in 1997 have proved this results of the joint survey can help both countries as well as other countries of the region to make estimates on survey and control operations leading to pesticide use reduction and reduced damage to agricultural crops.

Before starting its work the survey team received reports on desert locusts from various southern areas of I.R.Iran such as Kerman, Bam, Jiroft and

Fig. 1: Rainfall in Baluchistan from Dec 1997 to middle May 1998.



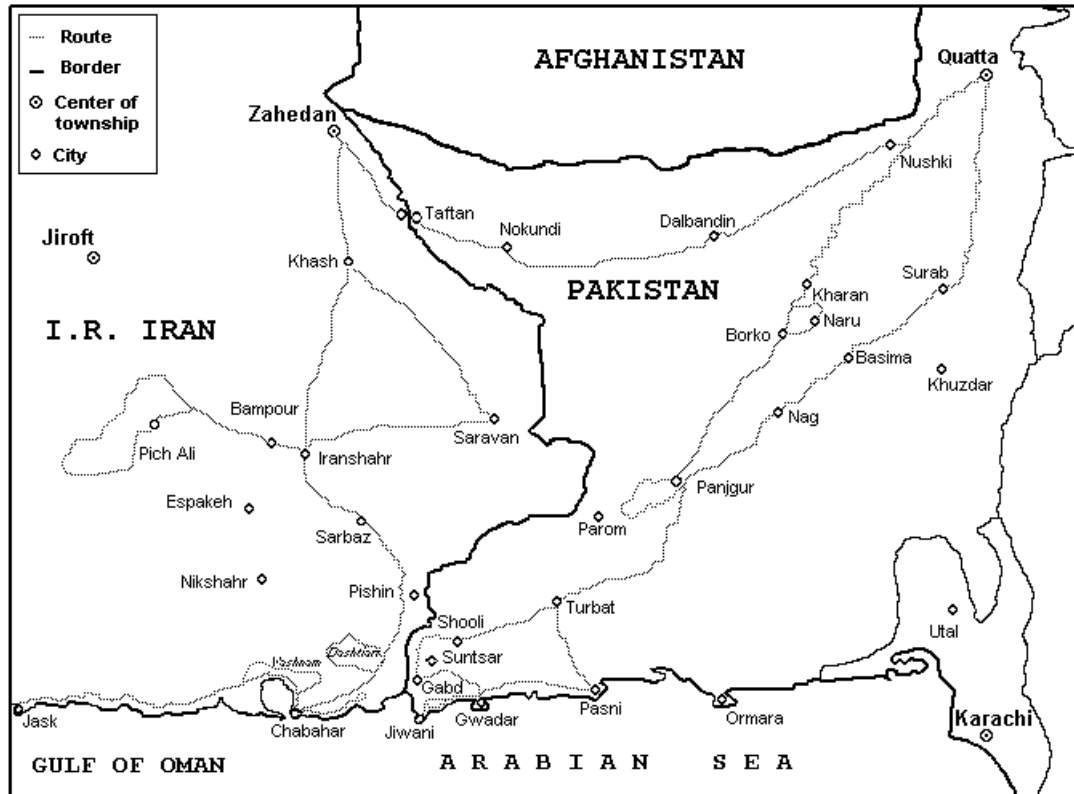
Kahnouj. Therefore, decision was made to expand the survey areas in Iran. This decision, however, was not realized due to lack of suitable vehicles in Iran and the joint survey was carried out only in Baluchistan region in southeastern Iran and western Pakistan.

In view of the reports received on desert locusts in southern I.R.Iran the team proposed that the title of the survey be change to what appears on this report.

Both sides of Baluchistan are quite alike in terms of topography, vegetation, and soil texture. They end in the Gulf of Oman and the Arabian Sea on the south. The coastal stripe is the most important part of the Baluchistan region as far as desert locusts are concerned.

The two big deserts of Jazmurian in Iran and Baluchistan in Pakistan form a large area of the central Baluchistan region.

Fig.2: Route of survey team in 1998.



Work Details

The survey team consisted of four locust experts from I.R. Iran and Pakistan accompanied by a maintenance assistant from each country (Appendix 1).

It was the first time that a maintenance assistant accompanied the Iranian team in both countries significantly facilitating their work. The survey team stayed in government - owned rest houses in Iran and, at times, in Pakistan.

The vehicles provided by Pakistan were in quite a good shape and one of them had wireless, whereas the vehicles provided by the Sistan and Baluchistan Agricultural Organization were by no means in good condition.

The Iranian team crossed the Mirjaveh border point on 18th April and joined the team from Pakistan. The survey team visited various areas in Baluchistan of Pakistan until May 4th and entered Iran through the Taftan border point on the same day after 17 days of survey in Pakistan.

The team from Pakistan returned to their country on May 18th spending 13 for survey in Iran (Appendix 2).

Using the method recommended by FAO during the survey the team recorded rainfall, vegetation and locust data on the forms provided by FAO. The team made stops in areas with green vegetation and sandy soil texture and after walking a distance of 250-1000 m recorded the developmental phase and behavior of the locust observed, type and density of vegetation, and soil type and moisture on the relevant forms.

During the survey of this year the team was tentatively divided into two groups each consisting of an Iranian and a Pakistani expert. This enabled the team to visit more areas; thus it is proposed to be continued during future joint surveys. In this connection however, the following points need consideration:

- In the absence of wireless for both groups the method can be used only in areas with roads.
- One group stops at a certain distance from the other and carries out survey activities. The former must wait until the latter finishes its job and passes by.
- The second group must proceed after the first group has made its stop.

Assistance was sought from local experts in finding areas with locust harboring potential. Rural people and shepherds were inquired as much as possible about locust populations and the last rainfall. Each expert used a GPS for geographical location. Temperature and relative humidity were measured by two rotary humidistats. A laptop was used for recording and analysis of data.

Discussion

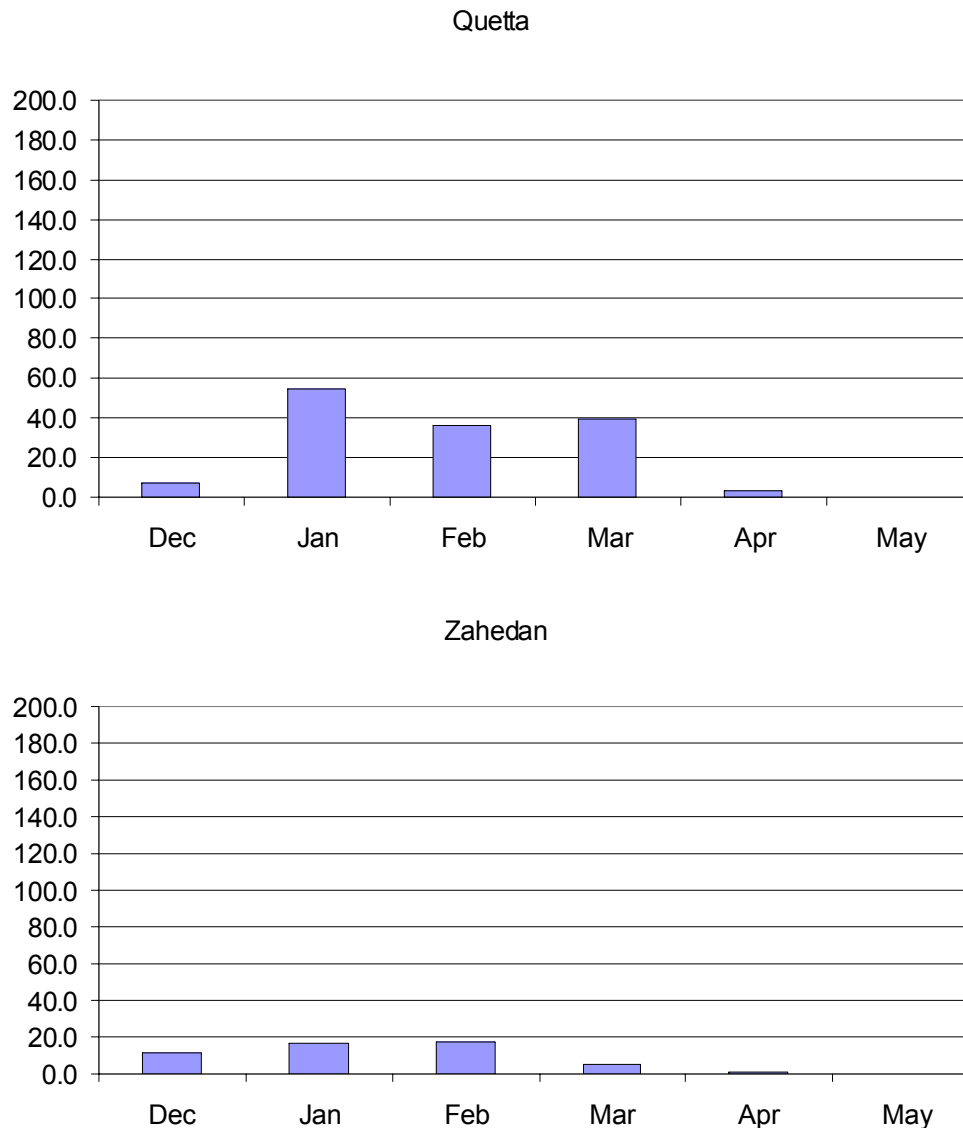
Baluchistan may be divided geographically as follows:

- A)** The northern region with mountain chains that have in between them vast Plains with clay-loamy soil covered with a thin layer of sand.
- B)** The central region which has large valleys with loamy soil. Many seasonal Streams pass through these valleys. Dates and wheat are grown in this Region.
- C)** The southern region on the coastal areas along the Gulf of Oman and the Arabian Sea. This coastal stripe with sand and year - round moisture has the highest potentiality for desert locust activities. Various tropical fruits are grown in this region.

A. The Northern Baluchistan

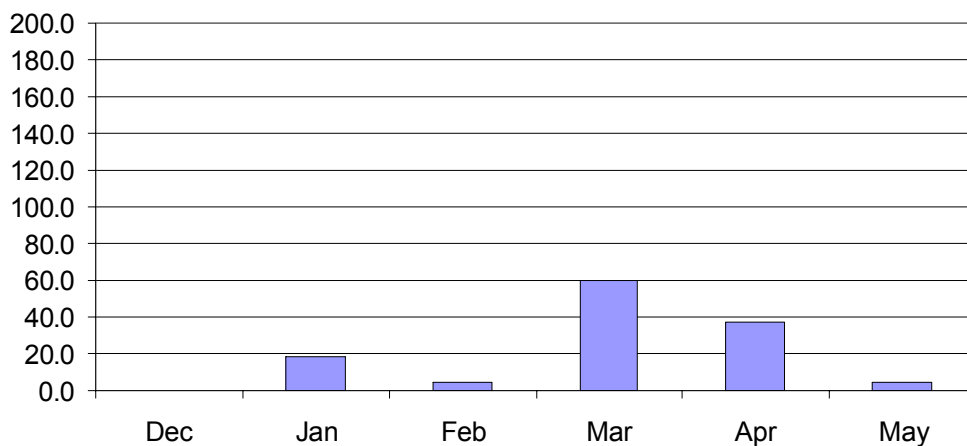
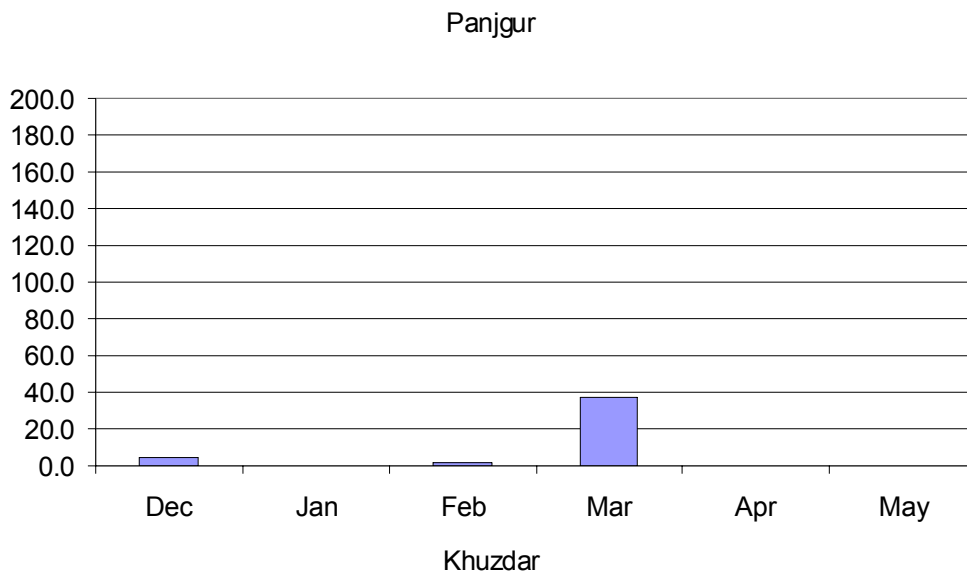
Taftan mountain chain in I.R. Iran and Raskuh in Pakistan separate the northern and central regions. Large plains in this region extend from Zahedan in Iran to Nushki in Pakistan. Except for the irrigated wheat fields seen on the way vegetation in the region was dry due to insufficient rainfall. The rainfall in Quetta was good. This area however, is not suitable for locust egg - laying due to its high altitude. Prevailing plants of the region are *Lycium sp.*, *Pennisetum divisium*, *Tanarix sp.*, and *Panicurn turgidum*.

Generally Nushki is the only area of significance with respect to desert locust, which is not likely to have big populations this year due to lack of rainfall.



B. Central Baluchistan

This region is limited to Taftan Mountains on the south and Raskuh Mountains. In this region Khoran and Rakhshan Valleys are known for their desert locust egg - laying potential. Vegetation in central Baluchistan of Pakistan was meager due to little rainfall and no significant population was observed. Only in Sorvan, a small locality in Panjgur area some adults were observed on the slope of a hill facing a wheat field. It is recommended that the area be surveyed frequently so that the possible nymphs-though seeming remote-are controlled in time.

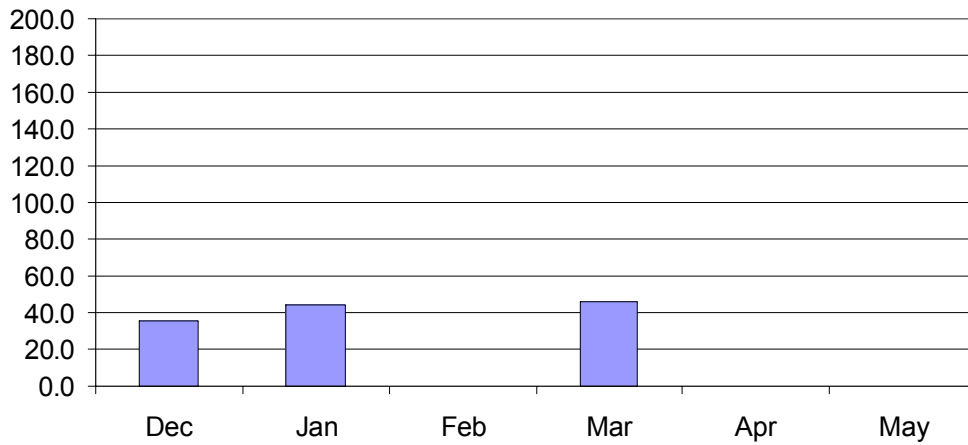


A number of solitary adult locusts were observed in Saravan, Zaboli and Suran areas in Iran. In view of the climatical conditions population increase in the region is not likely. Nymphs of solitarious and gregarious phases were seen forming groups in Motor Davari, Kurehay-e-memari and Sardegah areas.

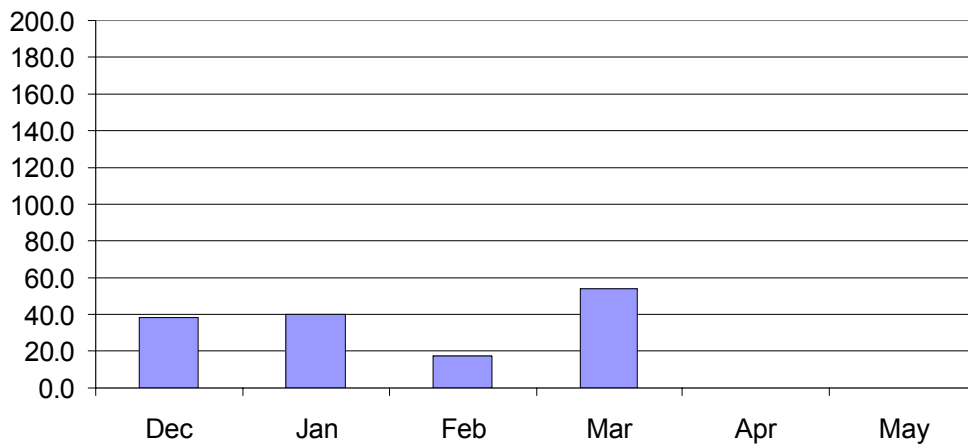
Iranshahr Agriculture Department was asked to carry out control operations against these groups. On return to Zahedan the team was informed that control operations in these areas had started immediately and by, 18th May 1500 ha had been treated with Fenitrothion ULV 96%.

In Jazmurian, which is, in fact, a catchment with an area of 60000 km², areas that had been sprayed two years ago were surveyed. No locusts were observed in these areas. Plants prevailing in the region were *Lytsium sp.*, *Pennisetum divisum*, *Tamarix sp.*, *Hamada elegans*, *Calligonum commosum*, *Panicum turgidum*, *Artemesia herba*, *Hertia intermedia*, *Heliotropium sp.*, *Lindigofera sp.*, *Cynodon dactylon*.

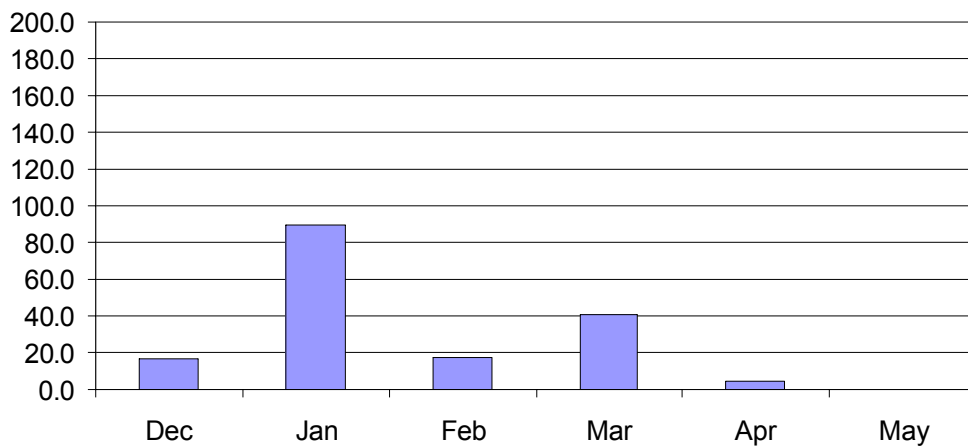
Saravan



Iranshahr

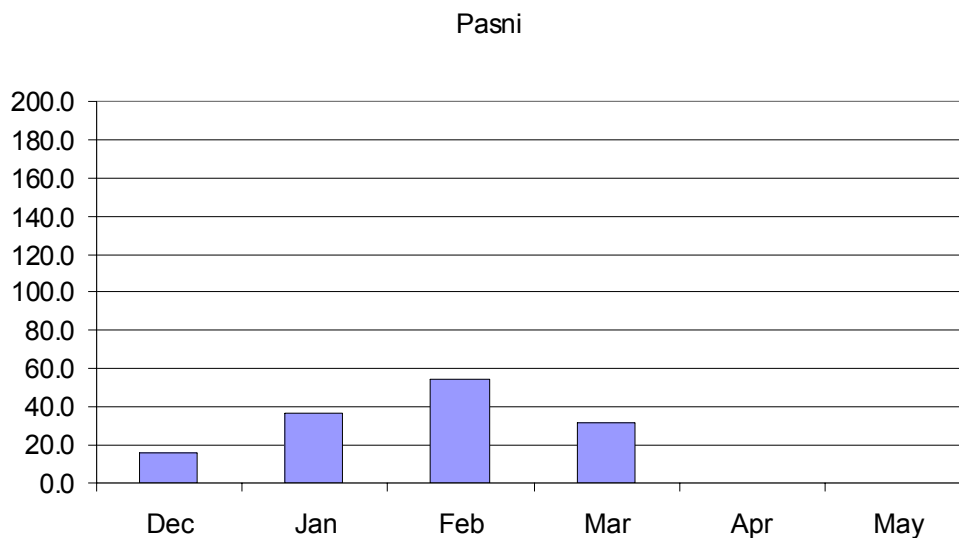
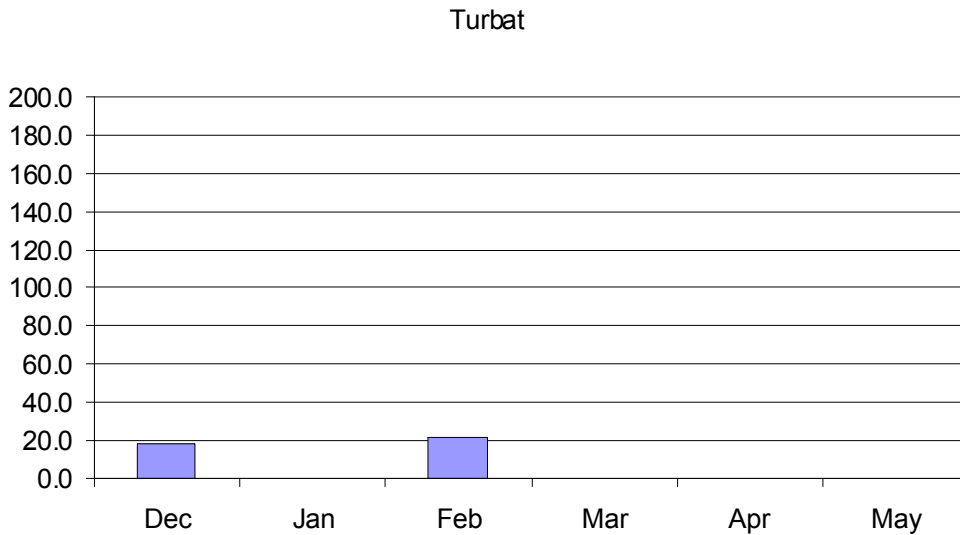


Khash



C. Southern Baluchistan

The coastal plains in southern Baluchistan extend from Jask in Iran to Pasni in Pakistan. These plains are best for egg - laying in both parts of Baluchistan. Pasni in Baluchistan of Pakistan is the only area with green vegetation in which



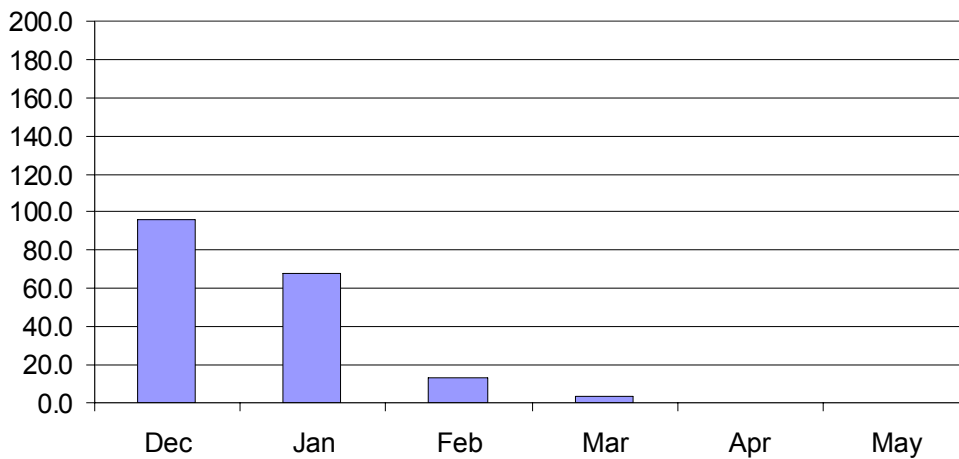
the Sang Kalat locality has some adult locusts and nymphs. In shooli area with the highest egg - laying potential vegetation was seen drying. These two areas need continuous surveillance and preparedness for possible control operations to suppress their movements to summer breeding areas.

Vegetation in Baluchistan of Iran was drying whereas it was in fairly good condition in the Pakistani side of Baluchistan.

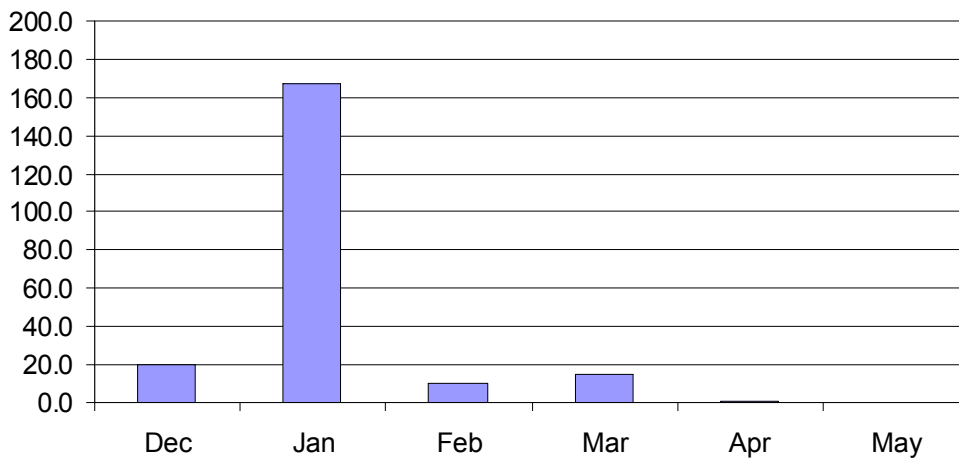
However, the locust populations were larger, particularly in Chahbahar area. Solitary desert locusts were observed in most of the surveyed areas of the Iranian side of Baluchistan among which Poshti and Kaki to the west, Ramin

and Kachoo, to the east and Brizhar to the north of Chahbahar had high density adult population. To suppress desert locust movements to summer breeding areas the local plant protection department was asked to carry out control operations followed by regular surveillance of the area. Plants prevailing in this area are *Lycium sp.*, *Pensisetum divisum*, *Tamarix sp.*, *Panicum turgidum*, *region Hamada elegans*, *Calligonum Commosum*, *Artemisia herba*, *Hertia intermedia*, *Heliotropium sp.*, *Indigfera sp.*, *Cynodon dactylon*, *Dactylostenum scindicum*, *Cyperus arenarius*, *Rhazy stricta*, *Zizyphus nummulari*, *Salsola sp.*, *Atriplex sp.*, and *Accacia arabied abida*.

Chahbahar



Jask



Conclusions and Recommendations

A. Desert Locust

This year Baluchistan of Pakistan had less precipitation compared to Baluchistan of Iran in which rainfall started earlier during the current year and ended later than usual. It can be said that the wet season has been longer than last year. More importantly, rainfall in the Iranian side of Baluchistan had a more uniform pattern compared last year and resulted in persistence of vegetation in the region.

Generally desert locust situation in Pakistan was relatively calm. Only Sorvan in Panjgur area, Shooli in Turbat area and Gorani Chah in Pasni area seem to need continuous surveillance.

Immediate control operations were carried out in kurehay-e-memari locality in Iranshahr and surroundings of Ramin in Chabahar area in the Iranian side of Baluchistan as was recommended by the survey team. These areas need continuous surveillance in view of the possible escapes.

B. Joint Survey of 1999

It is proposed that the joint survey is carried out next year and the following points are considered:

1. If possible the starting date of the survey of next year be changed to April 1st. Since the Iranian New year holidays start on 21st of March causing a disruption in the progress of the survey related affairs FAO is requested to issue the survey authorization for 1999 right after Christmas holidays so that both teams will have enough times to carry out the formalities of the survey.

2. The experts participating in the survey need to be experienced and well informed of the survey procedures. Drivers must be familiar with driving in desert regions and roads that are difficult to pass.

3. To make optimal use of modern equipment and technology in desert Locust survey it is suggested that an FAO expert accompany the survey team next year. This will help the Iranian and Pakistani experts to become familiar with the latest developments in the field desert locust control and transfer them to their colleagues.

4. Survey activities must be carried out between 6 - 12 am and 3 - 7 p.m.

5. The Plant Protection authorities of the two countries are requested again to find a way for the obtainment of a border crossing permit through Mand - Pishin so that the team will not have to drive back a long distance to enter Iran.

6. Since a member of the survey team got malaria this year taking precautionary measures for future teams are recommended.

Appendix 1. Survey Participants (Surname in Capital)

I.R.Iran

Mehdi GHAEMIAN (team leader): Locust Information Officer, P.P.O., Tehran
Mohamad Zaher RAJABI: Plant Protection Officer, P.P.O., Tehran
Ahmad BAHRAMI: Maintenance Assistant, P.P.O., Tehran
Bidjan DARVISH: Driver, P.P.O., Tehran
Asghar SABOUNI: Driver, P.P.O., Tehran
KHAJEH MAHMOUDI: Driver, Sistan and Baluchistan Agricultural Organization, Zahedan
MIR LASHKARI: Driver, Sistan and Baluchistan Agricultural Organization, Zahedan

Pakistan

Dr. Iqbal Husain PATHAN (team leader): Deputy Director (Locust), P.P.D., Sukkur
Khurshid Anwer SYED: Entomologist (Locust), P.P.D., Karachi
Mohamad BUX: Maintenance Assistant, P.P.D., Karachi
Mushtaq Hussain SHAH: Driver, P.P.D., Karachi
Muhammad SULEMAN: Driver, P.P.D., Islamabad
Sooba KHAN: Driver, P.P.D., Turbat
Nazir Hussain SHAH: Driver, P.P.D., Karachi

Appendix 2. Itinerary and Kilometer Travelled/Surveyed

Row	Day	Date	Direction	Night halt	Km Surveyed
1	1	18-Apr-98	Taftan - Dalbandin	Dalbandin	295
2	2	19-Apr-98	Dalbandin - Nushki	Nushki	220
3	3	20-Apr-98	Nushki - Kharan	Kharan	142
4	4	21-Apr-98	Kharan - Borko - Kharan	Kharan	247
5	5	22-Apr-98	Kharan - panjgur	Panjgur	329
6	6	23-Apr-98	Panjgur - Parome - Panjgur	Panjgur	211
7	7	24-Apr-98	Panjgur - Turbat	Turbat	261
8	8	25-Apr-98	Turbat - Sulaika - Turbat	Turbat	81
9	9	26-Apr-98	Turbat - Pasni - Gorani chah - Pasni	Pasni	150
10	10	27-Apr-98	Pasni - Chakuli - Gwadar	Gwadar	220
11	11	28-Apr-98	Gwadar - Jiwani - Gwadar	Gwadar	280
12	12	29-Apr-98	Gwadar - Bishal - Suntsar - Shooli - Turbat	Turbat	248
13	13	30-Apr-98	Turbat - Sami - Tajaban - Panjgur	Panjgur	260
14	14	01-May-98	Panjgur - Kalat	Kalat	475
15	15	02-May-98	Kalat – Quetta	Quetta	267
16	16	03-May-98	Quetta - Taftan	Taftan	652
17	17	04-May-98	Taftan - Mirjaveh (cross the border)	-	-
					4338
17	0	04-May-98	Mirjaveh - Zahedan	Zahedan	100
18	1	05-May-98	Zahedan - Saravan	Saravan	350
19	2	06-May-98	Saravan - Iranshahr(Bampour)	Bampour	304
20	3	07-May-98	Bampur - Sardegah - Bampur	Bampur	89
21	4	08-May-98	Bampur - Garon-Dehno - Baghenil - Bampur	Bampur	335
22	5	09-May-98	Bampur - Chabahar	Chabahar	404
23	6	10-May-98	Chabahar - Zarabad - Jask	Jask	421
24	7	11-May-98	Jask - Zarabad - Chabahar	Chabahar	440
25	8	12-May-98	Chabahar - Beris - Negor - Chabahar	Chabahar	198
26	9	13-May-98	Chabahar - Berijdar - Daj - Pirsohrab - Dashtiari - Chabahar	Chabahar	340
27	10	14-May-98	Chabahar area	Chabahar	170
28	11	15-May-98	Chabahar - Bampur	Bampur	420
29	12	16-May-98	Bampur - Zahedan	Zahedan	380
30	13	17-May-98	Halt in Zahedan	Zahedan	-
-	-	18-May-98	Zahedan - Mirjaveh	-	100
					4051
					8389

Appendix 4. Daily rainfall (cont.)

Date	Iranshahr	Chabahar	Jask	Saravan	Khash	Zahedan	Khuzdar	Quetta	Turbat	Panjgur	Pasni
1-Dec	0	0	0	0	0	0	0	0	0	0	0
2-Dec	0	0	0	0	0	0	0	0	0	2	0
3-Dec	0	0	0	0	0	0	0	0	0	0	0
4-Dec	0	0.6	0	0	0	0	0	0	0	0	0
5-Dec	2.5	64	15.8	11.7	0.3	TR	0	0	0	0	0
6-Dec	10.5	0	0	16.5	3.7	6	0	0	15	0	0
7-Dec	0	0	0	3.3	0.2	0	0	0	3	2	0
8-Dec	0	0	0	0	0	0	0	0	0	0	0
9-Dec	0	0	0	0	0	0	0	0	0	0	0
10-Dec	0	0	0	0	0	0	0	0	0	0	0
11-Dec	3	0	0	0	1	0.4	0	0	0	0	0
12-Dec	0	0	0	0	0	0	0	0	0	0	0
13-Dec	0	0	0	0	0	0	0	0	0	0	0
14-Dec	19	0	2	1.8	9.4	3.7	0	0	0	0	0
15-Dec	0	0	0	0	0	0	0	0	0	0	16
16-Dec	0	0	0	0	0	0	0	4	0	0	0
17-Dec	0	0	0	0	0	0	0	0	0	0	0
18-Dec	0	0	0	0	0	0.8	0	0	0	0	0
19-Dec	0	0	0	0	0	0	0	0	0	0	0
20-Dec	0	0	2	0	0	0	0	0	0	0	0
21-Dec	3.3	32	0	2.3	1.5	0	0	0	0	0	0
22-Dec	0	0	0	0	0	0	0	3	0	0	0
23-Dec	0	0	0	0	0	0	0	0	0	0	0
24-Dec	0	0	0	0	0	0	0	0	0	0	0
25-Dec	0	0	0	0	0	0	0	0	0	0	0
26-Dec	0	0	0	0	0	0	0	0	0	0	0
27-Dec	0	0	0	0	0	0	0	0	0	0	0
28-Dec	0	0	0	0	0	0	0	0	0	0	0
29-Dec	0	0	0	0	0	0	0	0	0	0	0
30-Dec	0	0	0	0	0	0	0	0	0	0	0
31-Dec	0	0	0	0	0	0	0	0	0	0	0
1-Jan	0	0	0	0	0	0	0	0	0	0	0
2-Jan	0.9	0	37.2	0	4.6	0.7	0	0	0	0	0
3-Jan	5.4	1.7	9	1.8	9.8	0	0	0	0	0	0
4-Jan	0	0	0	0	0	0	0	0	0	0	0
5-Jan	0	0	0	0	0	0	0	0	0	0	0
6-Jan	6.6	2	0	2.4	0	0.1	0	0	0	0	0
7-Jan	0	0	0	0	0	0	0	0	0	0	0
8-Jan	0	0	0	0	0	0	3	3	0	0	0
9-Jan	0	0	0	0	0	0	0	0	0	0	0
10-Jan	0	0	0	0	1.4	0	0	0	0	0	0
11-Jan	0	1.6	2.9	0	0.7	0	1	1	0	0	0
12-Jan	0	0	0	0	0	0	14	14	0	0	0
13-Jan	1.3	21.5	8.4	1.4	5.4	1	0	0	0	0	0
14-Jan	0	0	0	0	0	0	0	0	0	0	0
15-Jan	0	0	0	0	0	0	0	0	0	0	0
16-Jan	0	0	0	0	0	0	0	0	0	0	0
17-Jan	0	0	0	0	0	0	0	0	0	0	0
18-Jan	0	0	0	0	0	0	0	0	0	0	0
19-Jan	0	0	0	0	0	0	0	0	0	0	0

Appendix 4. Daily rainfall (cont.)

Date	Iranshahr	Chabahar	Jask	Saravan	Khash	Zahedan	Khuzdar	Quetta	Turbat	Panjgur	Pasni
20-Jan	0	0	0	0	0	0	0	0	0	0	0
21-Jan	0	0	0	0	0	0	0	0	0	0	0
22-Jan	0	0	0	0	0	0	0	0	0	0	0
23-Jan	0	0	0	0	0	0	0	0	0	0	37
24-Jan	0	0	0	0	0	0	0	0	0	0	0
25-Jan	0	0	16.2	0	0	0	0	0	0	0	0
26-Jan	1.3	3.2	79.1	0	0	0	0	0	0	0	0
27-Jan	0	0	0	0	0	0	0	0	0	0	0
28-Jan	0	9	1	0	0	0	0	6	0	0	0
29-Jan	23	21.3	13.8	28.6	67.4	14.4	0	2	0	0	0
30-Jan	1.2	1.4	0	10.4	0	0	0	16	0	0	0
31-Jan	0	5.7	0	0	0	0	0	13	0	0	0
1-Feb	0	0	0	0	0	0	0	0	0	0	0
2-Feb	0	0	0	0	0	0	0	0	22	0	18
3-Feb	0	0	0	0	0	0	0	0	0	0	0
4-Feb	0	0	0	0	0	0	0	0	0	0	0
5-Feb	0	0	0	0	TR	TR	0	0	0	0	0
6-Feb	0	0	0	0	0	0	0	0	0	0	0
7-Feb	0	0	0	0	0	0	0	0	0	0	0
8-Feb	0	0	0	0	0	0	0	0	0	0	0
9-Feb	0	0	0	0	0	0	0	0	0	0	0
10-Feb	0	0	0	0	0	0	0	0	0	0	0
11-Feb	0	0	0	0	0	0	0	0	0	0	0
12-Feb	5.8	0	0.4	0	4.5	5.1	4	0	0	0	0
13-Feb	11.3	0	0	TR	7.4	9.2	0	0	0	0	0
14-Feb	0	0	0	0	0	0	0	17	0	2	0
15-Feb	0	0	0	0	0	0	0	0	0	0	0
16-Feb	0	0	0	0	0	0	0	0	0	0	0
17-Feb	0	0	0	0	0	0	0	0	0	0	0
18-Feb	0	0	0	0	0	0	0	1	0	0	0
19-Feb	0	0	0	0	0	0	0	0	0	0	0
20-Feb	0	0	0.4	0	0	0	0	0	0	0	0
21-Feb	0	7.5	7.2	0	0	TR	0	0	0	0	0
22-Feb	TR	5	0.7	0.3	5.7	3	0	0	0	0	0
23-Feb	0	0	0	0	0	0	0	18	0	0	36
24-Feb	0	0	0	0	0	0	0	0	0	0	0
25-Feb	0	0	0	0	0	0	0	0	0	0	0
26-Feb	0	0	0	0	0	0	0	0	0	0	0
27-Feb	0	0	0	0	0	0	0	0	0	0	0
28-Feb	0	0.6	1	0	0	0	0	0	0	0	0
1-Mar	23.2	0	4.8	0.8	7.3	0.1	0	0	0	0	0
2-Mar	30.3	3.7	10.4	44.2	29.4	4.1	33	0	0	0	0
3-Mar	0	0	0	0	0	0	22	0	0	37	0
4-Mar	0	0	0	0	0	0	0	12	0	0	32
5-Mar	0	0	0	0	0	0	0	0	0	0	0
6-Mar	0	0	0	0	0	0	0	0	0	0	0
7-Mar	0	0	0	0	0	0	0	0	0	0	0
8-Mar	0	0	0	0	0	0	0	0	0	0	0
9-Mar	0	0	0	0	4.2	0	0	9	0	0	0
10-Mar	0.3	0	0	0	0	0	0	0	0	0	0

Appendix 4. Daily rainfall (cont.)

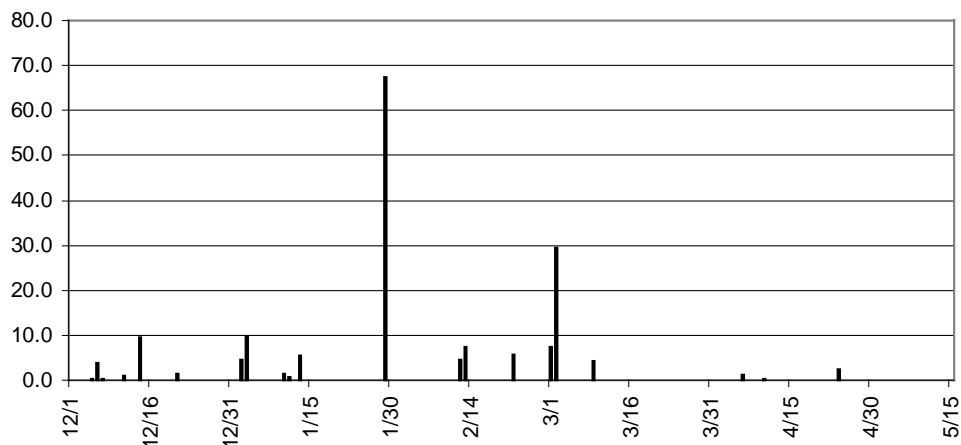
Date	Iranshahr	Chabahar	Jask	Saravan	Khash	Zahedan	Khuzdar	Quetta	Turbat	Panjgur	Pasni
11-Mar	0	0	0	0	0	0	0	0	0	0	0
12-Mar	0	0	0	0	0	0	0	0	0	0	0
13-Mar	0	0	0	0	0	0	0	0	0	0	0
14-Mar	0	0	0	0	0	0	0	0	0	0	0
15-Mar	0	0	0	0	0	0	0	0	0	0	0
16-Mar	0	0	0	1	0	0	0	0	0	0	0
17-Mar	0	0	0	0	0	0	5	16	0	0	0
18-Mar	0	0	0	0	0	0	0	0	0	0	0
19-Mar	0	0	0	0	0	0	0	0	0	0	0
20-Mar	0	0	0	0	0.1	1.3	0	0	0	0	0
21-Mar	0	0	0	0	0	0	0	0	0	0	0
22-Mar	0	0	0	0	0	0	0	2	0	0	0
23-Mar	0	0	0	0	0	0	0	0	0	0	0
24-Mar	0	0	0	0	0	0	0	0	0	0	0
25-Mar	0	0	0	0	0	0	0	0	0	0	0
26-Mar	0	0	0	0	0	0.1	0	0	0	0	0
27-Mar	0	0	0	0	0	0	0	0	0	0	0
28-Mar	0	0	0	0	0	0	0	0	0	0	0
29-Mar	0	0	0	0	0	0	0	0	0	0	0
30-Mar	0	0	0	0	0	0	0	0	0	0	0
31-Mar	0	0	0	0	0	0	0	0	0	0	0
1-Apr	0	0	0	0	0	0	0	0	0	0	0
2-Apr	0	0	0	0	0	0	0	0	0	0	0
3-Apr	0	0	0	0	0	0	0	0	0	0	0
4-Apr	0	0	0	0	0	0	0	0	0	0	0
5-Apr	0	0	0	0	0	0	0	0	0	0	0
6-Apr	0	0	0	0	1.3	0	0	0	0	0	0
7-Apr	0	0	0	0	0	0	0	0	0	0	0
8-Apr	0	0	0	0	0	0	0	0	0	0	0
9-Apr	0	0	0	0	0	0	0	0	0	0	0
10-Apr	0	0	0	0	0.3	TR	0	0	0	0	0
11-Apr	0	0	0	0	0	0	0	0	0	0	0
12-Apr	0	0	0	0	0	0	0	0	0	0	0
13-Apr	0	0	0	0	0	0	0	0	0	0	0
14-Apr	0	0	0	0	0	0	0	0	0	0	0
15-Apr	0	0	0	0	0	0	0	0	0	0	0
16-Apr	0	0	0	0	0	0	0	0	0	0	0
17-Apr	0	0	0	0	0	0	0	0	0	0	0
18-Apr	0	0	0	0	0	0	0	0	0	0	0
19-Apr	0	0	0	0	0	0	0	0	0	0	0
20-Apr	0	0	0	0	0	0	0	0	0	0	0
21-Apr	0	0	0	0	0	TR	0	0	0	0	0
22-Apr	0	0	0	0	0	0	0	0	0	0	0
23-Apr	0	0	0.5	0	0	0	0	0	0	0	0
24-Apr	TR	0	0	0	2.4	1.2	0	0	0	0	0
25-Apr	0	0	0	0	0	0	0	0	0	0	0
26-Apr	0	0	0	0	0	0	0	3	0	0	0
27-Apr	0	0	0	0	0	0	37	0	0	0	0
28-Apr	0	0	0	0	0	0	0	0	0	0	0

Appendix 4. Daily rainfall

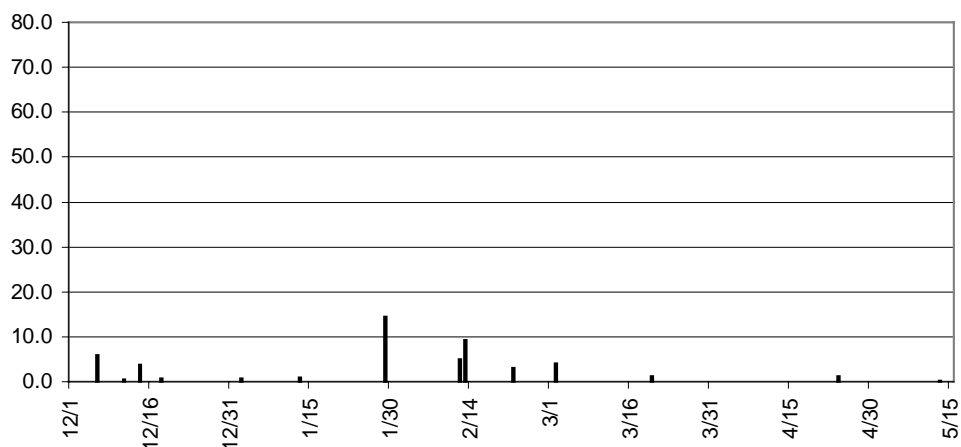
Date	Iranshahr	Chabahar	Jask	Saravan	Khash	Zahedan	Khuzdar	Quetta	Turbat	Panjgur	Pasni
29-Apr	0	0	0	0	0	0	0	0	0	0	0
30-Apr	0	0	0	0	0	0	0	0	0	0	0
1-May	0	0	0	0	0	0	0	0	0	0	0
2-May	0	0	0	0	0	0	4	0	0	0	0
3-May	0	0	0	0	0	0	0	0	0	0	0
4-May	0	0	0	0	0	0	0	0	0	0	0
5-May	0	0	0	0	0	0	0	0	0	0	0
6-May	0	0	0	0	0	0	0	0	0	0	0
7-May	0	0	0	0	0	0	0	0	0	0	0
8-May	0	0	0	0	0	0	0	0	0	0	0
9-May	0	0	0	0	0	0	0	0	0	0	0
10-May	0	0	0	0	0	0	0	0	0	0	0
11-May	0	0	0	0	0	0	0	0	0	0	0
12-May	0	0	0	0	0	0	0	0	0	0	0
13-May	0	0	0	0	0	0.2	0	0	0	0	0
14-May	0	0	0	0	0	0	0	0	0	0	0
15-May	0	0	0	0	0	0	0	0	0	0	0

Appendix 5. Rainfall charts (cont.)

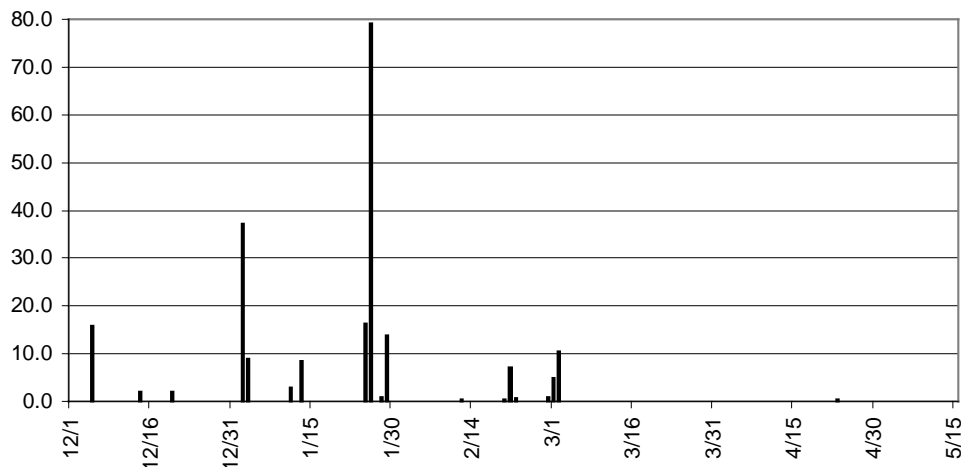
Khash



Zahedan

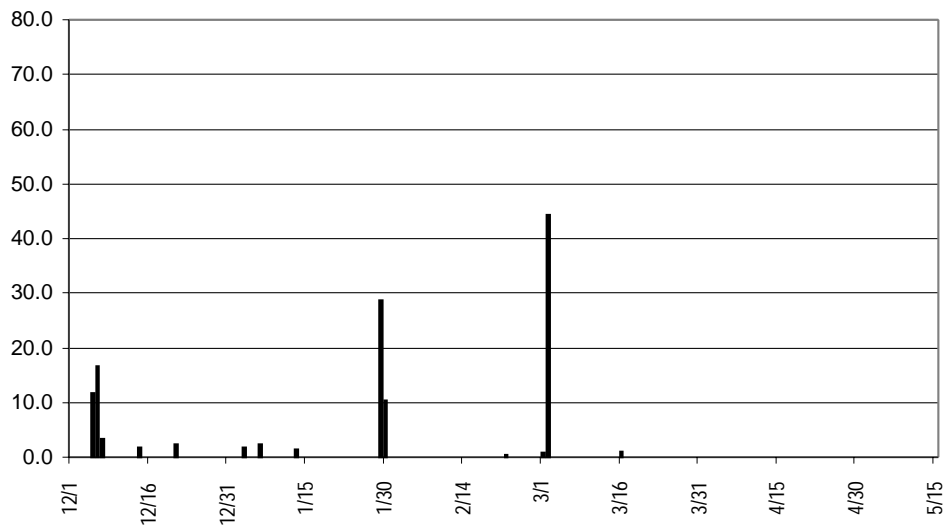


Jask

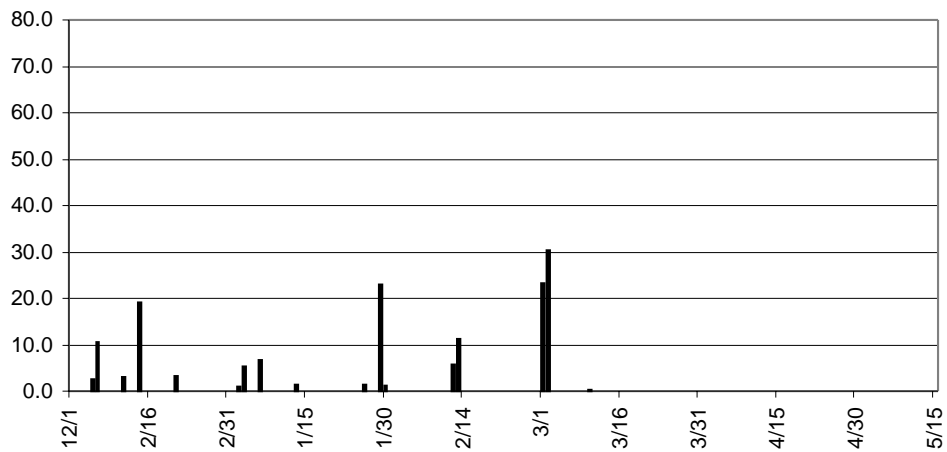


Appendix 5. Rainfall charts (cont.)

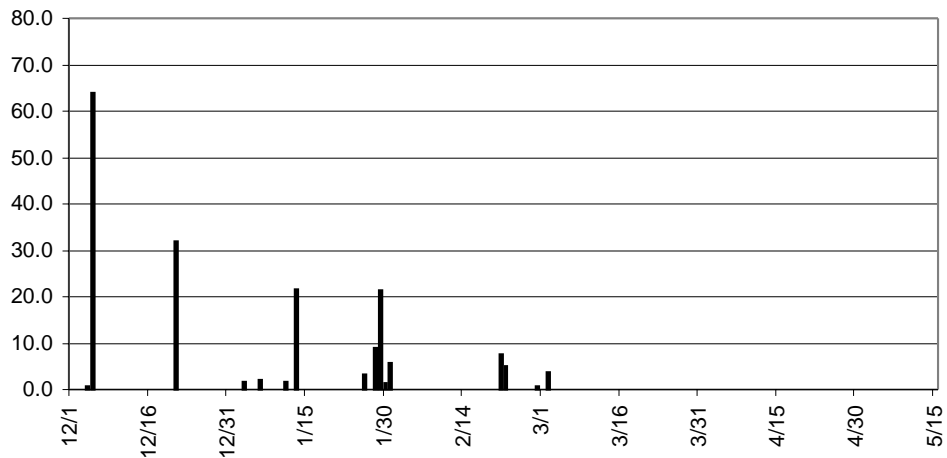
Saravan



Iranshahr

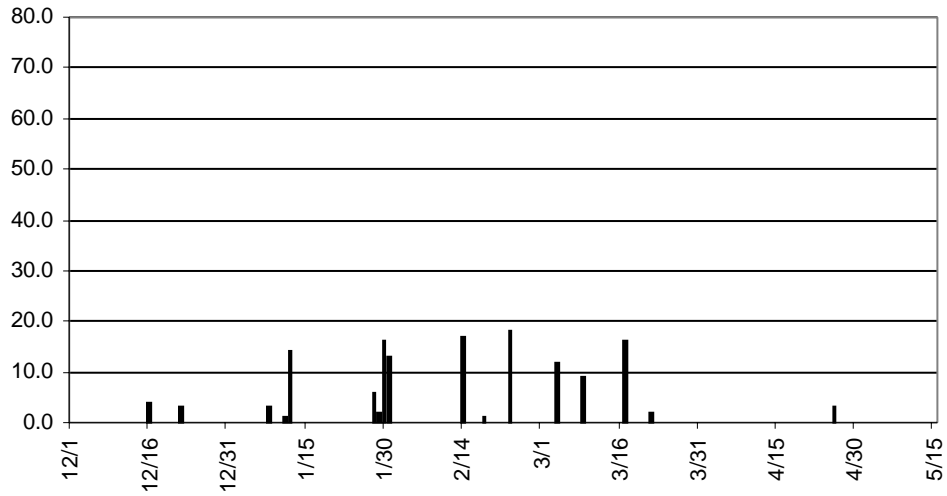


Chabahar

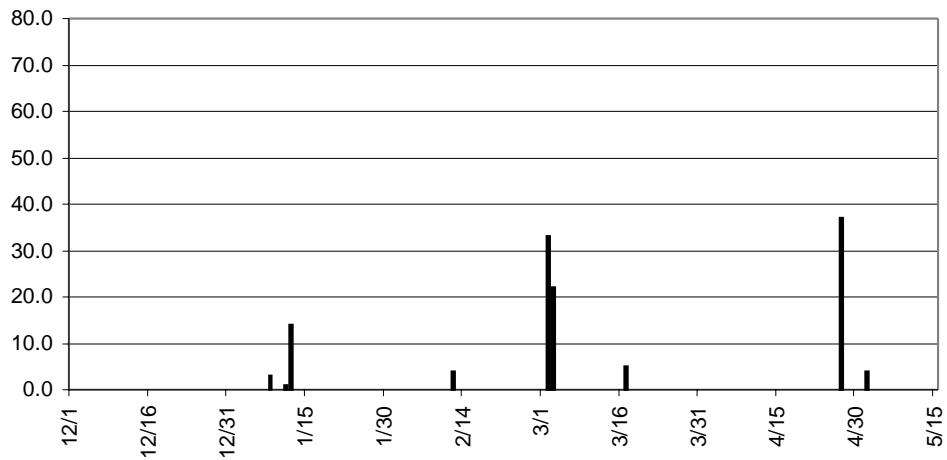


Appendix 5. Rainfall charts (cont.)

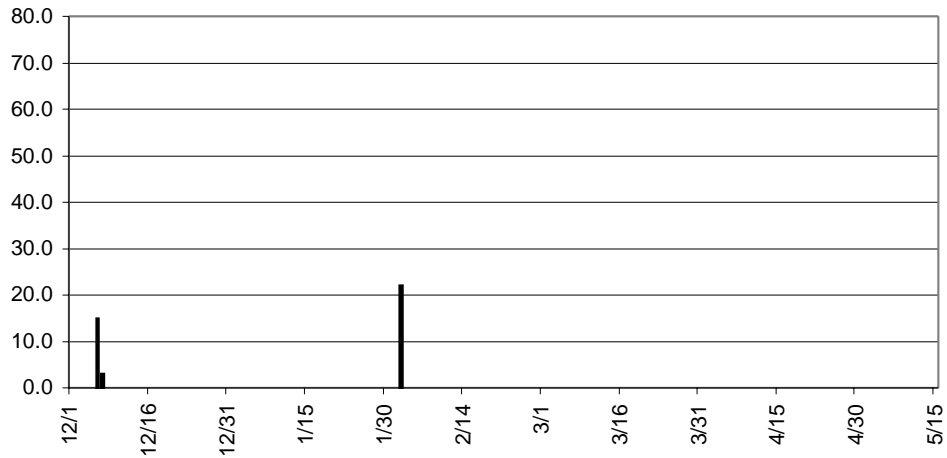
Quetta



Khuzdar

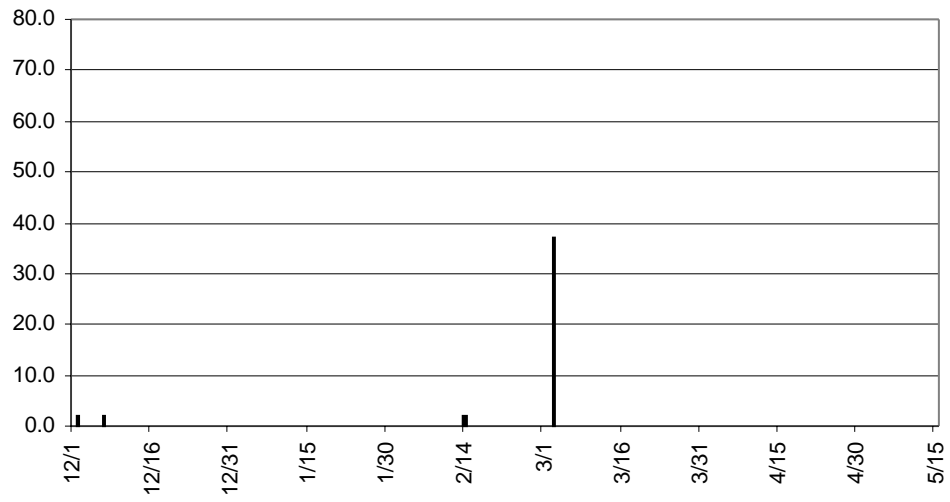


Turbat

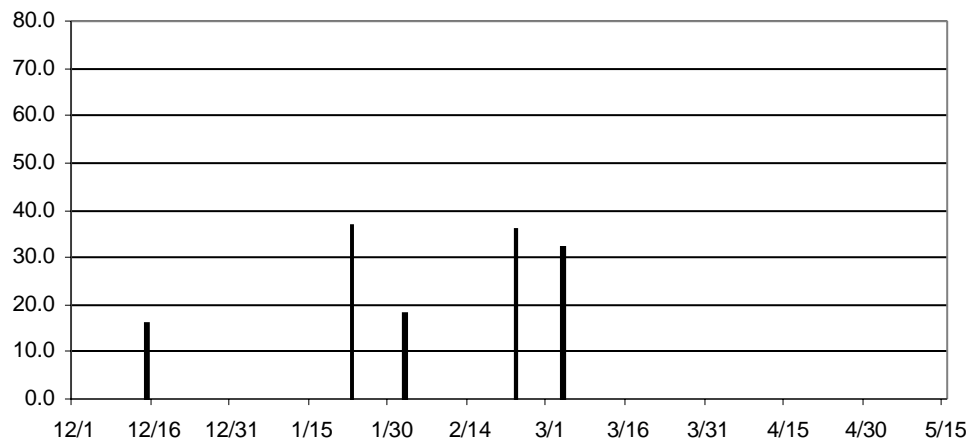


Appendix 5. Rainfall charts

Panjgur



Pasni



Appendix 6. Meteorological observations (Pakistan)

Date	Hour	Name	Coordinates	Temp	RH%	Wind	Direction	Remarks
19-Apr-98	10:15	Chiatar	285729/650704	35	26	Calm	-	rain on 98/3/28 (9 mm)
19-Apr-98	11:10	Padag	285903/651508	37	22	Calm	-	rain on 98/3/28 (9 mm)
19-Apr-98	17:30	Nushki	293309/660132	31	56	Calm	-	rain on 98/3/28 (9 mm)
20-Apr-98	13:30	Kharan	283408/652532	36	50	Calm	-	rain on 98/3/28 (9 mm)?
21-Apr-98	10:00	Borko	280714/652224	35.5	20	Calm	-	-
22-Apr-98	11:20	Bassima	275335/654826	35.5	20	Light	southerly	-
22-Apr-98	12:50	Patack	274512/653704	35	16	Light	southerly	-
22-Apr-98	14:30	Nag	272310/650952	34	38	Calm	-	-
22-Apr-98	17:20	Panjgur	265836/640622	37	46	Calm	-	rain on 98/3/20 (8 mm)
23-Apr-98	09:30	Bonstan	265406/640443	31	56	Calm	-	rain on 98/3/5 (low)
23-Apr-98	10:50	Sorvan	265149/635806	34	54	Calm	-	rain on 98/3/5 (low)
23-Apr-98	11:10	Darakedab	264803/635038	32.5	60	Calm	-	rain on 98/3/5 (low)
23-Apr-98	12:30	Parome	264253/633003	37	46	Calm	-	-
24-Apr-98	11:45	Buleda chowk	262337/635918	37	46	Calm	-	-
24-Apr-98	12:50	Balgatar	261023/640210	38	46	Calm	-	-
24-Apr-98	13:40	Hoshab	260056/635303	36	54	Calm	-	-
24-Apr-98	17:50	Turbat	255928/630342	37	50	Calm	-	-
25-Apr-98	09:50	Kanyani kaur dasht	255518/624709	33	58	Mild	southerly	rain on 98/3/3
25-Apr-98	10:50	Sulaika	255320/624337	34	62	Mild	southerly	rain on 98/3/3
26-Apr-98	11:25	Zahrinekaur	253036/632554	39	36	Calm	-	rain on 98/3/3
26-Apr-98	12:55	Pasni	251600/632333	37	30	Moderate	southerly	rain on 98/3/3
26-Apr-98	17:10	Gorani chah	251616/632102	32	68	Strong	westerly	rain on 98/3/3
27-Apr-98	12:05	Chakuli	252536/631113	35	48	Moderate	westerly	-
27-Apr-98	12:40	Kallag	252650/630631	38	44	Moderate	southerly	-
27-Apr-98	16:15	Nalant	252153/624536	34	76	Strong	southwesterly	-
27-Apr-98	18:05	Gwadar	250819/621914	32	74	Moderate	southerly	-
28-Apr-98	10:25	Chhatti (I)	251638/620748	34	54	Calm	-	-
28-Apr-98	12:10	Jiwani	250305/614452	34	58	Calm	-	-
29-Apr-98	09:50	Bishal	252210/620430	30.5	73	Calm	-	-
29-Apr-98	10:50	Suntsar	253008/615058	34	73	Calm	-	-
29-Apr-98	15:30	Shooli	253522/620639	40	75	Calm	-	-
29-Apr-98	16:30	Chhatti (II)	253724/621505	38.5	46	Strong	southerly	-
29-Apr-98	18:00	Beri chah	254232/623737	37	56	Strong	southerly	-
30-Apr-98	10:05	Sami	260232/632443	32	56	Mild	easterly	-
30-Apr-98	11:30	Tajaban	261032/634318	32	68	Mild	easterly	-
30-Apr-98	16:10	Sang kalat	264059/635906	36	44	Mild	easterly	-
30-Apr-98	13:10	Sang kalat	264059/635906	36	44	Mild	easterly	rain on 98/4/30 (heavy)
01-May-98	10:10	Sabz ab	271310/643929	32	51	Mild	southeasterly	rain on 98/4/30 (heavy)

Appendix 6. Meteorological observations (I.R. Iran)

Date	Hour	Name	Coordinates	Temp	RH%	Wind	Direction	Remarks
05-May-98	15:00	Zahedan	293016/605040	25	63	calm	-	-
06-May-98	08:00	Saravan	272233/621937	21	52	calm	-	-
06-May-98	10:10	Shandan	272256/615423	27	50	mild	westerly	-
06-May-98	12:15	Khushab	270902/614827	30	14	mild	southeasterly	-
06-May-98	13:15	Qadr abad	270821/613414	30.5	15	mild	westerly	-
07-May-98	08:30	Motor davari	270719/604349	29	49	calm	-	rain on 98/3/3
07-May-98	10:30	Kooreh memari	270731/604018	27	26	calm	-	rain on 98/3/3
07-May-98	17:20	Sardegal	271347/602526	36	10	calm	-	rain on 98/3/3
07-May-98	18:10	Bampour	271255/602730	36	10	calm	-	rain on 98/3/3
08-May-98	8:40	Garon	270004/591859	31.5	14	calm	-	rain on 98/3/3
08-May-98	10:30	Dehno	270153/591338	35.5	10	calm	-	rain on 98/3/3
08-May-98	11:50	Baghenil	270629/592756	36.5	<10	calm	-	rain on 98/3/3
10-May-98	08:45	Gargder	252547/600520	32.5	73	calm	-	-
10-May-98	10:30	Bir	252645/594642	34.5	38	calm	-	-
10-May-98	11:05	Darak	252810/593017	33	58	calm	-	-
10-May-98	11:35	Poshti	252959/592630	34	45	mild	southerly	-
10-May-98	12:35	Kaki	253111/592418	35.5	60	mild	southerly	-
11-May-98	08:10	Hotdan	254233/575758	36.5	46	mild	southerly	rain on 98/3/3
11-May-98	09:40	Yekdar	254115/580609	38.5	42	mild	southerly	rain on 98/3/3
11-May-98	10:02	Jegin	254431/581258	40.5	<10	mild	southerly	rain on 98/3/3
12-May-98	08:55	Ramin	251625/604729	29.5	80	mild	southerly	rain on 98/3/3
12-May-98	09:38	Kachoo	251348/605610	27.5	93	mild	southerly	rain on 98/3/3
12-May-98	10:35	Bris	251153/610446	29.5	85	mild	southerly	rain on 98/3/3
13-May-98	08:30	Brejdard	252640/604423	29.5	74	calm	-	rain on 98/3/3
13-May-98	09:30	Maleki	252759/604122	33	53	mild	easterly	rain on 98/3/3
13-May-98	11:38	Daj	253520/604628	30.5	55	mild	easterly	rain on 98/3/3
13-May-98	12:05	Turkani	253808/605238	29.5	47	mild	easterly	rain on 98/3/3

Appendix 8. Itinerary for 1999

Row	Day	Date	Direction	Night halt
1	1	01-Apr-99	Pakistan team cross into Iran at Mirjaveh	Saravan
2	2	02-Apr-99	Saravan – Iranshahr(Bampour)	Bampour
3	3	03-Apr-99	Bampur – Sardegal – Bampur	Bampur
4	4	04-Apr-99	Bampur – Chabahar	Chabahar
5	5	05-Apr-99	Chabahar (eastern coastal plains)	Chabahar
6	6	06-Apr-99	Chabahar – Zarabad – Jask	Jask
7	7	07-Apr-99	Jask - Minab – Bandarabbas	Bandarabbas
8	8	08-Apr-99	Bandarabbas – Lengeh – Bandarabbas	Bandarabbas
9	9	09-Apr-99	Bandarabbas – Kahnuj	Kahnuj
10	10	10-Apr-99	Kahnuj – Jiroft	Jiroft
11	11	11-Apr-99	Jiroft – Bam	Bam
12	12	12-Apr-99	Bam area	Bam
13	13	13-Apr-99	Bam – Zahedan	Zahedan
14	14	14-Apr-99	Cross into Pakistan at Mirjaveh	Dalbandin
15	15	15-Apr-99	Dalbandin – Nushki	Nushki
16	16	16-Apr-99	Nushki – Kharan	Kharan
17	17	17-Apr-99	Kharan (Borko and Naroo area)	Kharan
18	1	18-Apr-99	Kharan – Panjgur	Panjgur
19	2	19-Apr-99	Panjgur (Parome area)	Panjgur
20	3	20-Apr-99	Panjgur – Turbat	Turbat
21	4	21-Apr-99	Turbat (Sulaika area)	Turbat
22	5	22-Apr-99	Turbat – Pasni	Pasni
23	6	23-Apr-99	Pasni area	Pasni
24	7	24-Apr-99	Pasni – Gwadar	Gwadar
25	8	25-Apr-99	Gwadar – Turbat via Suntsar	Turbat
26	9	26-Apr-99	Turbat – Panjgur	Panjgur
27	10	27-Apr-99	Panjgur – Quetta	Quetta
28	11	28-Apr-99	Halt in Quetta	Quetta
29	12	29-Apr-99	Quetta – Dalbandin	Dalbandin
30	13	30-Apr-99	Dalbandin – Taftan	Taftan
-	-	01-May-99	Iran team crosses into Iran at Taftan	-