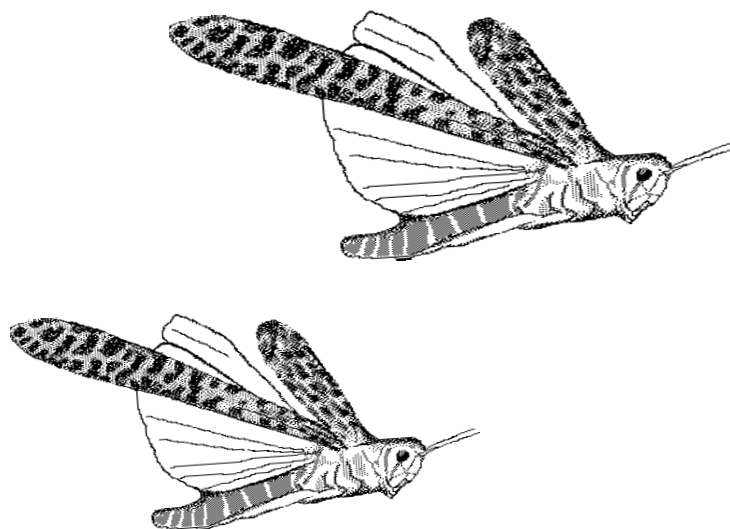


# Desert Locust Joint Survey in the Spring Breeding Areas of the I.R. Iran and Pakistan

April 2012



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**Desert Locust Joint Survey**  
**in the Spring Breeding Areas of Pakistan and I. R. Iran**

**April 2012**

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS  
Rome, 2012



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## **Acknowledgements**

The Joint Survey team would like to express their special gratitude to the Adviser and Director General, and the Deputy Director (HQ) of the Department of Plant Protection, Ministry of Food Security and Research, Government of Pakistan, and to the Head of the Plant Protection Organization, Government of I. R. Iran for extending their generous guidance, support in making the necessary arrangements and co-ordination for a successful joint survey between the two countries under the prevailing circumstances in 2012. The participants also appreciate the assistance of the Sistan-Baluchistan Jihad-e Agriculture Organization for providing facilities.

The team cordially acknowledges Keith Cressman, Secretary of the FAO Commission for Controlling the Desert Locust in South-West Asia (SWAC) and Senior Locust Forecasting Officer (DLIS/AGPMM, FAO HQ), for his personal efforts without which a successful survey would not be possible.

Thanks also go to the offices of the FAO Representatives in Pakistan and I. R. Iran for their assistance.

The Joint Survey team also wishes to solicit and thank all those who assisted in the smooth undertaking of the survey.

## Summary

The main objective of the Pakistan/I.R. Iran Joint Desert Locust Survey is to check the potential Desert Locust spring breeding areas on either side of the border so that, on the basis of the survey results, locust survey and control operations in the summer monsoon breeding areas along the Indo-Pakistan border can be planned for the upcoming summer. The Pakistan/I.R. Iran Joint Survey has been undertaken since 1995. The present survey was the 18<sup>th</sup> survey in a series of annual joint surveys under the aegis of FAO.

In view of security concerns in the survey area of Baluchistan since 2009, two options were discussed for the Joint Survey at the 27<sup>th</sup> Session of SWAC held in Islamabad, Pakistan on 25-27 January 2011:

- Option A: The 2012 Joint Survey would be undertaken as a routine survey, that is, the Joint Survey team would consist of locust officers from both countries who will carry out the survey as a single joint team, first in Baluchistan, Pakistan and then in the provinces of Sistan-Baluchistan, Hormozgan and Kerman in I.R. Iran.
- Option B: The 2012 Joint Survey would be carried out by each survey team separately in its own territory, that is, a Pakistani team would survey Baluchistan, Pakistan and an Iranian team would survey Sistan-Baluchistan, Hormozgan and Kerman provinces in southeast I.R. Iran. At the end of survey, the Pakistani team leader and national locust unit head will visit Zahedan to discuss the survey results, exchange information and to draft a final single joint survey report with their respective counterparts and the Iranian team.

This year, Option B was adopted and the Joint Survey was carried out simultaneously in both countries on 1-21 April 2012 on either side of the border as per the approved itinerary.

Ecological conditions were dry in both countries except few a places near Kharan, Panjgur and in coastal areas of Pakistan, and near Sulan in the Jaz Murian Basin of I.R. Iran. No locusts were observed in I.R. Iran; however a few isolated solitarious adults were seen in Nushki, Washuk and Kharan areas in Pakistan. A maximum population of 100 adults/ha was observed at 28.72944N/65.18722E in Kharan area where control operations were carried out last year.

Due to recent rainfall in Khuzdar, Kharan, Nushki and Dalbandin areas of Pakistan and Iranshahr and Khash of I.R. Iran, there is a possibility that low numbers of solitarious adults may be present or persist in these areas. Therefore, strict vigilance is required during the coming months.

The Joint Survey should continue to be carried out on an annual basis. A number of recommendations were suggested for the 2013 Joint Survey.

# **Desert Locust Joint Survey in the Spring Breeding Areas of Pakistan and I.R. Iran**

**April 2012**

## **Introduction**

The main objective of the Pakistan/I.R. Iran Joint Desert Locust Survey is to check the potential Desert Locust spring breeding areas on either side of the border so that, on the basis of the survey results, locust survey and control operations in the summer monsoon breeding areas along the Indo-Pakistan border can be planned for the upcoming summer. The Pakistan/I.R. Iran Joint Survey has been undertaken since 1995. The present survey was the 18<sup>th</sup> survey in a series of annual joint surveys under the aegis of FAO.

The participants and itinerary of this year's survey are listed in Appendix 1 and Appendix 2 respectively. Survey results for each country, rainfall data and maps are presented in Appendix 3-6. Photos taken during the survey are in Appendix 7. The proposed itineraries for the joint survey in 2013 are shown in Appendix 8.

## **Methodology**

The team consisted of two locust experts each from I.R. Iran and Pakistan. The Joint Survey was conducted from 1 to 21 April 2012, covering an estimated area of 9,710 ha in Pakistan and 8,350 ha in I.R. Iran. Two 4x4 pick-up vehicles were used by each country covering a total distance of 13,875 km, consisting of 7,675 km in Pakistan and 6,200 km in I.R. Iran. A total of 105 stops were made during the survey in Pakistan and 98 in I.R. Iran. In Pakistan, most of the potential breeding areas such as Naru and Borko desert in Kharan, Prome valley of Panjgur, Shooly-Bashooly of Turbat, Kulanch valley of Pasni and the coastal areas were surveyed. In I.R. Iran, the potential breeding areas such as the Suran valley of Saravan, Jolgeh Chah Hashem desert and Dalgan area of Iranshahr, Vashnam plains near Chabahar, Zaribad area of Konarak, Jask area, Jaz Murian Basin and Ghale Ganj of Kahnuj were surveyed. Both teams used eLocust2 during the survey to record their observations and transmit the data to their respective national locust units. The Pakistan team used eLocust2 PAK07 but due to a fault it was replaced by PAK16.

No solitarious or gregarious locusts were observed in I.R. Iran. Vegetation was drying or already dry in most places while density varied from low to dense. Soil moisture was dry in most of the areas. In Pakistan, no gregarious locusts were observed; however, isolated solitarious adults were seen in some areas of Nushki, Kharan, Washuk and Turbat. Vegetation was green in a few localities, while in most places it was drying to dry. Vegetation density was low to medium. Soil moisture was dry with a few exceptions where it was wet.

At the end of the survey, the team leaders and the national locust unit heads of both countries met in Zahedan, I.R. Iran for three days (23-25 April) to discuss the survey results and finalize the joint report.

## **Results and Discussion**

This year most of the locust breeding areas in I. R. Iran received low rainfall during March 2012, particularly in Chabahar, Khash, Saravan, Konarak, Zaribad, Jask, Jaz Murian Basin, Kahnuj and Iranshahr areas. Nevertheless, vegetation was dry or drying, the weather was very hot, and no locusts were observed in I.R. Iran. In Pakistan, light to medium rains fell



in the spring breeding areas. Vegetation was greening or green in Nushki and Kharan areas while it was drying to dry in the northern interior near Dalbandin as well as near the coast.

The spring breeding areas in both countries can be divided geographically into three parts.

#### Northern Baluchistan

The northern part of Baluchistan stretches from Mirjaveh in I.R. Iran to Nushki in Pakistan. High elevation sandy and rocky plains dominate this area. The vegetation from Taftan to Dalbandin was dry. No solitarious or gregarious Desert Locusts were observed in this area.

#### Central Baluchistan

The central part of Baluchistan extends from south of Taftan and the Ros Kooch Mountains to the Kech and Mand mountains north of Turbat in Pakistan. This region consists of the Great Sandy Desert west of Kharan valley, and the Rakhshan valley of Panjgur that extends west into I.R. Iran to the Saravan, Suran, and Zaboli valleys, and from Iranshahr to the Jaz Murian Basin and Kahnuj. Light to medium rainfall was received in Kharan and Prome valleys of Panjgur in Pakistan, and the soil was wet under the surface. In Pakistan, isolated solitarious adults were seen in some areas of Nushki, Kharan, Washuk and Turbat.

#### Southern Baluchistan

The southern part of Baluchistan consists of coastal areas that extend from Bandar Abbas, Jask, Chabahar, Gwadar in I.R. Iran to Jiwani, Gwadar, Pasni, Ormara and Uthal in Pakistan. In Pakistan, the area between Pasni to Ormara is famous for locust breeding while areas from Chabahar to Gwadar in Iran are also important breeding areas. Ecological conditions were drying and dry in Pakistan with a few exceptions where the vegetation was green, while conditions were dry and drying in I.R. Iran. No solitarious or gregarious Desert Locusts were observed in this area.

### **Conclusions and Recommendations**

#### Desert Locust

The Joint Survey results confirm that the Desert Locust situation is calm in the spring breeding areas in both countries.

Only low numbers of solitarious adults were seen at a few places in Pakistan. Due to poor ecological conditions in the spring breeding areas, gregarious locust activity is unlikely during the current season. However, the recent rainfall received in some areas may lead to the appearance of scattered solitarious locust populations during May. Therefore, strict vigilance should be maintained in the potential breeding areas, especially where solitarious adults were seen during the Joint Survey.

### Joint Survey of 2013

Although the security situation in Baluchistan, Pakistan is not suitable so far, it is hoped that the situation will be return to normal in 2013 and both countries can carry out the regular Joint Survey as in previous years.

The Joint Survey team suggests the following recommendations:

1. The Joint Survey should be continued in the coming years to monitor Desert Locust activity on both sides of the I.R. Iran/Pakistan border and to check for any possible indication of Desert Locust migration across the Persian Gulf.
2. It is hoped that the security situation in Baluchistan, Pakistan will return to normal so that both countries can undertake the regular Joint Survey in 2013; otherwise, Option B as approved by the 27<sup>th</sup> session of SWAC should be adopted.
3. Walkie-talkies provided previously by FAO are of limited range. FAO is requested to provide four sets of higher range (4-5 km) to each country.
4. The route in I.R. Iran from Bandar Abbas to Kahnuj should be slightly modified as follows: Bandar Abbas, Ghale Ganj, Sowlan to Ghale Ganj with night halt in Kahnuj changed to Ghale Ganj. The route of Iranshahr to Jolgeh Chah Hashem to Iranshahr should be slightly modified as follows: Iranshahr to Jolgeh Chah Hashem to Dalgan and night halt changed to Dalgan. This is due to a new road from Bandar Abbas to Ghale Ganj. In this way, the survey team no longer needs to travel to Kahnuj for overnight and, instead, can stay in Ghale Ganj.
5. The route in Pakistan from Nokundi to Mashkhel and Washuk is extremely dangerous from a security point of view. Moreover, it is a very long route and the team cannot reach Washuk for an overnight stay. It is therefore suggested that the route may be modified and the potential breeding area is covered from the Washuk side.
6. The SWAC Secretary is requested to raise the issue of increasing the DSA at the next session of SWAC.
7. In addition to the regular team members, two locust officers from Afghanistan, one each from Pakistan and I.R. Iran may join this activity in order to get trained.
8. If ecological and rainfall conditions are poor, the start of the 2013 Joint Survey could be postponed for ten days, taking into consideration that both teams received reports of rainfall at the end of this year's survey.
9. The Pakistan team reiterated their willingness to host next year's end-of-the-survey meeting in Karachi. If there are insufficient funds from the GOE of the Joint Survey, then two possibilities could be considered:
  - a. PPD of Pakistan and FAO send an official invitation to PPO of I.R. Iran two months before the Joint Survey. Upon receipt of this invitation, the Government of I.R. Iran may accept to cover the meeting expenditures.
  - b. SWAC covers the flight ticket expenditures.
10. The practice to start the Joint Survey in Pakistan first is good and should also be continued in the future in the case Option A is possible to implement.
11. Young, energetic, enthusiastic and experienced locust experts should be nominated for future joint surveys as it is a tough job rather than an opportunity to be availed.
12. At least one driver in both countries should be from Baluchistan and have experience and familiarity with off-road driving in the desert, sandy, and mountainous terrain.
13. It was recommended that among the two drivers, one should be driver *cum* fitter / mechanic who will also be responsible for emergency repair of vehicles during the survey. He should be well equipped with a tool kit and emergency spare parts.
14. The survey team including locust experts, drivers and maintenance assistant, driver *cum* fitter should be well trained before the start of the survey and well versed regarding their duties and responsibilities.

15. Pakistan should arrange, manage and improve guest houses accommodations in Baluchistan and the locust office in-charges of the respective outposts in Pakistan should co-ordinate and help the Joint Survey team. There were inadequate arrangements this year.
16. The daily sustainable allowance (DSA) is considered to be low in comparison to inflation and the tough desert job.
17. Two vehicles in each country should be exclusively maintained and reserved for the annual Joint Survey.
18. Survey teams should be provided with the latest updated high resolution (1:250,000) maps for the entire survey area (Baluchistan, Pakistan and Sistan-Baluchistan, I. R. Iran) by FAO and the Locust Departments.

## **APPENDICES**



## Appendix 1. Survey participants

	Name	Title	City
<b>I.R. Iran</b>			
<b>Team Leader</b>	Ali Babali Fashki	PPO expert	Tehran
<b>Locust Officer</b>	Qulam Hossain Taymori	PPO expert	Zahedan
<b>Maintenance Asst.</b>	Abozar Amiri Nejad	Maintenance asst.	Bandar Abbas
<b>Drivers</b>	Nabi Allah Taghibagi	Mechanic / Driver	Tehran
	Qulam Kazemi	Driver	Zahedan
<b>Pakistan</b>			
<b>Team Leader</b>	Alif Khan	Asst. Entomologist	Bahawalpur
<b>Locust Officer</b>	Wali Muhammad	Locust Officer	Sukkar
<b>Maintenance Asst.</b>	Muhammad Saleem	Maintenance asst.	Karachi
<b>Drivers</b>	Saeed Ahmad	Mechanic / Driver	Bahawalpur
	Nazir Ahmad	Driver	Karachi

## Appendix 2. Itinerary

Day	Date	Pakistan route	Night Halt
1	01/04/2012	Quetta → Nushki area → Nushki	Nushki
2	02/04/2012	Nushki → Mull area → Dalbandin → Nokundi → Taftan	Taftan
3	03/04/2012	Taftan → Nokundi → Mashkhel → Washuk	Washuk
4	04/04/2012	Washuk → Naru Desert → Kharan	Kharan
5	05/04/2012	Kharan → Totazai → Ormagai → Kharan	Kharan
6	06/04/2012	Kharan → Haji Chah → Jamak → Kharan	Kharan
7	07/04/2012	Kharan → Borku → Ziarat → Shamsi → Borku	Borku
8	08/04/2012	Borku → Basima → Nag → Panjgur	Panjgur
9	09/04/2012	Panjgur → Prome → Panjgur	Panjgur
10	10/04/2012	Panjgur → Hoshab → Turbat	Turbat
11	11/04/2012	Turbat → Solaika → Turbat	Turbat
12	12/04/2012	Turbat → Suntsar → Gwadar	Gwadar
13	13/04/2012	Gwadar → Jiwani → Gwadar	Gwadar
14	14/04/2012	Report day for first half of survey	Gwadar
15	15/04/2012	Gwadar → Kolanch area → Pasni	Pasni
16	16/04/2012	Pasni → Pasni area → Pasni	Pasni
17	17/04/2012	Pasni → Ormara coastal area → Uthal	Uthal
18	18/04/2012	Uthal → Uthal area → Uthal	Uthal
19	19/04/2012	Uthal → Wadh → Khuzdar	Khuzdar
20	20/04/2012	Khuzdar → Qallat area → Quetta	Quetta
21	21/04/2012	Report day for second half of survey	Quetta
22	22/04/2012	Locust Head and Team Leader travel to Zahedan	Zahedan
23	23/04/2012	Locust Heads / Team meeting to exchange views and information	Zahedan
24	24/04/2012	Locust Heads / Team meeting to prepare report	Zahedan
25	25/04/2012	Locust Heads / Team meeting to submit report	Zahedan
26	26/04/2012	Teams and Locust Heads back to their homes	

Day	Date	I.R. Iran route	Night Halt
1	01/04/2012	Start joint survey	Zahedan
2	02/04/2012	Zahedan → Khash → Gosht → Saravan	Saravan
3	03/04/2012	Saravan → Soran → Saravan	Saravan
4	04/04/2012	Saravan → Zaboli → Iranshahr	Iranshahr
5	05/04/2012	Iranshahr → Jolgeh Chah Hashem → Iranshahr	Iranshahr
6	06/04/2012	Iranshahr → Dalgan Area → Iranshahr	Iranshahr
7	07/04/2012	Iranshahr → Espakeh → Nikshahr → Chabahar	Chabahar
8	08/04/2012	Chabahar → E Vashnam → Kambel → Kohdim → Chabahar	Chabahar
9	09/04/2012	Chabahar → W Vashnam → Maleki → Berijdar → Afkan → Chabahar	Chabahar
10	10/04/2012	Chabahar → Beris → Sham → Govatr → Chabahar	Chabahar
11	11/04/2012	Chabahar → Konarak area → Chabahar	Chabahar
12	12/04/2012	Chabahar → Zar Abad → Jask	Jask
13	13/04/2012	Jask area	Jask
14	14/04/2012	Jask → Jask Kohneh → Koh Mobarak → Minab → Bandar Abbas	Bandar Abbas
15	15/04/2012	Report day for first half of survey	Bandar Abbas
16	16/04/2012	Bandar Abbas → Manujan → Ghale Ganj → Solan → Kahnuj	Kahnuj
17	17/04/2012	Kahnuj → Ghale Ganj → W Jaz Murian → Ghale Ganj → Kahnuj	Kahnuj
18	18/04/2012	Kahnuj → Ghale Ganj → E Jaz Murian → Zehkalut → Dalgan	Dalgan
19	19/04/2012	Dalgan → Bampour → Sardegal → Iranshahr	Iranshahr
20	20/04/2012	Iranshahr → Zahedan	Zahedan
21	21/04/2012	Report day for second half of survey	Iranshahr
22	22/04/2012	Locust Head travel to Zahedan	Zahedan
23	23/04/2012	Locust Heads / Team meeting to exchange views and information	Zahedan
24	24/04/2012	Locust Heads / Team meeting to prepare report	Zahedan
25	25/04/2012	Locust Heads / Team meeting to submit report	Zahedan
26	26/04/2012	Teams and Locust Heads back to their homes	



### Appendix 3. Desert Locust Survey Results of Pakistan

Row	Date	Latitude	Longitude	Area surveyed	Habitat	Vegetation	Vegetation density	Last rain date	Quantity	Soil moisture	Locust Presence	Area infested	Stage	Maturity	Appearance	Behaviour	Population density	To control
1	02/04/2012	29.50611	65.98972	90	Plain	Dry	Low	11/03/2012	Low	Dry	Absent	-	-	-	-	-	-	-
2	02/04/2012	29.48806	65.92000	120	Wadi	Dry	Low	11/03/2012	Low	Dry	Absent	-	-	-	-	-	-	-
3	02/04/2012	29.42417	65.84639	150	Dunes	Dry	Low	11/03/2012	Low	Dry	Absent	-	-	-	-	-	-	-
4	02/04/2012	29.39361	65.73555	130	Dunes	Dry	Low	11/03/2012	Low	Dry	Absent	-	-	-	-	-	-	-
5	02/04/2012	29.37028	65.65334	200	Dunes	Dry	Low	11/03/2012	Low	Dry	Absent	-	-	-	-	-	-	-
6	03/04/2012	29.46417	65.97305	50	Dunes	Green	Low	11/03/2012	Low	Dry	Absent	-	-	-	-	-	-	-
7	03/04/2012	29.36889	65.90584	100	Crops	Green	Medium	11/03/2012	Low	Wet	Absent	-	-	-	-	-	-	-
8	03/04/2012	29.26139	65.76862	200	Crops	Green	Medium	11/03/2012	Low	Wet	Absent	-	-	-	-	-	-	-
9	03/04/2012	29.07667	65.49694	150	Crops	Green	Medium	11/03/2012	Low	Wet	Absent	-	-	-	-	-	-	-
10	03.04.2012	29.20310	65.28301	200	Crop	Green	Low	2012/11/03	Low	Dry	Present	100 ha	Adult	Mature	Solitary	Isolated	25/ha	No
11	03/04/2012	28.91833	64.87972	300	Dunes	Drying	Low	11/03/2012	Low	Dry	Absent	-	-	-	-	-	-	-
12	03/04/2012	28.86833	64.37695	500	Dunes	Drying	Low	11/03/2012	Low	Dry	Absent	-	-	-	-	-	-	-
13	03/04/2012	28.73500	63.83361	200	Dunes	Drying	Low	11/03/2012	Low	Dry	Absent	-	-	-	-	-	-	-
14	04/04/2012	28.71695	63.21000	500	Plain	Dry	Low	11/03/2012	Low	Dry	Absent	-	-	-	-	-	-	-
15	04/04/2012	28.80333	62.78695	500	Plain	Drying	Low	11/03/2012	Low	Dry	Absent	-	-	-	-	-	-	-
16	04/04/2012	28.16944	62.90389	500	Plain	Dry	Low	11/03/2012	Low	Dry	Absent	-	-	-	-	-	-	-
17	04/04/2012	27.84333	62.98528	300	Plain	Dry	Low	11/03/2012	Low	Dry	Absent	-	-	-	-	-	-	-
18	04/04/2012	27.63500	63.17278	200	Hills	Dry	Low	11/03/2012	Low	Dry	Absent	-	-	-	-	-	-	-
19	05/04/2012	27.53445	63.20694	100	Hills	Dry	Low	11/03/2012	Low	Dry	Absent	-	-	-	-	-	-	-
20	05/04/2012	27.43250	63.25722	500	Hills	Drying	Low	11/03/2012	Low	Dry	Absent	-	-	-	-	-	-	-
21	05/04/2012	27.49389	63.66417	100	Wadi	Green	Low	20/03/2012	Low	Wet	Absent	-	-	-	-	-	-	-
22	05/04/2012	27.49694	64.17305	300	Hills	Drying	Low	11/03/2012	Low	Dry	Absent	-	-	-	-	-	-	-
23	05.04.2012	27.68444	64.43584	500	Dunes	Drying	Low	2012/11/03	Low	Dry	Present	200 ha	Adult	Mature	Solitary	Isolated	25/ha	No
24	05.04.2012	27.64833	64.25584	100	Dunes	Drying	Low	2012/11/03	Low	Dry	Present	50 ha	Adult	Mature	Solitary	Isolated	50/ha	No
25	05/04/2012	27.63806	64.32694	150	Dunes	Drying	Low	11/03/2012	Low	Dry	Absent	-	-	-	-	-	-	-

Row	Date	Latitude	Longitude	Area surveyed	Habitat	Vegetation	Vegetation density	Last rain date	Quantity	Soil moisture	Locust Presence	Area infested	Stage	Maturity	Appearance	Behaviour	Population density	To control
26	05/04/2012	27.68556	64.55473	200	Dunes	Drying	Low	11/03/2012	Low	Dry	Absent	–	–	–	–	–	–	–
27	2012/05/04	27.86194	65.02889	500	Dunes	Green	Low	2012/06/03	Low	Dry	Present	300 ha	Adult	Mature	Solitary	Isolated	25/ha	No
28	06/04/2012	27.77389	64.79945	500	Dunes	Dry	Low	11/03/2012	Low	Dry	Absent	–	–	–	–	–	–	–
29	06/04/2012	27.87194	65.07000	100	Crops	Green	Low	06/03/2012	Low	Dry	Absent	–	–	–	–	–	–	–
30	2012/06/04	27.93833	65.34111	100	Dunes	Green	Low	2012/11/03	Low	Dry	Present	40 ha	Adult	Mature	Solitary	Isolated	50/ha	No
31	06/04/2012	27.87833	65.16722	200	Dunes	Green	Low	06/03/2012	Low	Dry	Absent	–	–	–	–	–	–	–
32	07/04/2012	28.30028	65.32750	100	Dunes	Green	Low	06/03/2012	Low	Dry	Absent	–	–	–	–	–	–	–
33	2012/07/04	28.16139	65.35722	500	Dunes	Green	Low	2012/06/03	Low	Dry	Present	250 ha	Adult	Mature	Solitary	Isolated	100/ha	No
34	2012/07/04	28.34750	65.42472	500	Dunes	Green	Low	2012/06/03	Low	Dry	Present	400 ha	Adult	Mature	Solitary	Isolated	100/ha	No
35	07/04/2012	28.09410	65.21260	500	Dunes	Green	Low	06/03/2012	Low	Dry	Absent	–	–	–	–	–	–	–
36	07/04/2012	28.36000	65.39945	100	Dunes	Green	Low	06/03/2012	Low	Dry	Absent	–	–	–	–	–	–	–
37	2012/07/04	28.37111	65.53389	100	Dunes	Drying	Low	2012/06/03	Low	Dry	Present	50 ha	Adult	Mature	Solitary	Isolated	25/ha	No
38	07/04/2012	28.3825	65.51334	50	Dunes	Drying	Low	06/03/2012	Low	Dry	Absent	–	–	–	–	–	–	–
39	07/04/2012	28.52528	65.42111	10	Dunes	Drying	Low	06/03/2012	Low	Dry	Absent	–	–	–	–	–	–	–
40	2012/08/04	28.56472	65.30167	100	Dunes	Drying	Low	2012/06/03	Low	Dry	Present	60 ha	Adult	Mature	Solitary	Isolated	50/ha	No
41	2012/08/04	28.72944	65.18722	300	Crops	Green	Medium	2012/06/03	Low	Wet	Present	200 ha	Adult	Mature	Solitary	Isolated	100/ha	No
42	09/04/2012	28.55972	65.42139	10	Town	Green	Low	08/04/2012	Low	Wet	Absent	–	–	–	–	–	–	–
43	10/04/2012	28.55306	65.52639	100	Crops	Green	Medium	09/04/2012	Low	Wet	Absent	–	–	–	–	–	–	–
44	10/04/2012	28.47472	65.63722	100	Plain	Drying	Low	09/04/2012	Low	Wet	Absent	–	–	–	–	–	–	–
45	2012/10/04	27.98028	65.78584	500	Crops	Green	Medium	2012/09/04	Low	Wet	Present	200 ha	Adult	Mature	Solitary	Isolated	50/ha	No
46	10/04/2012	28.23583	65.69056	50	Hills	Green	Low	09/04/2012	Low	Wet	Absent	–	–	–	–	–	–	–
47	10/04/2012	27.35306	64.89500	200	Hills	Dry	Low	24/01/2012	Low	Dry	Absent	–	–	–	–	–	–	–
48	10/04/2012	27.02333	64.23167	50	Crops	Green	Medium	08/04/2012	Low	Wet	Absent	–	–	–	–	–	–	–
49	11/04/2012	26.89972	64.02583	50	Crops	Green	Low	04/02/2012	Low	Dry	Absent	–	–	–	–	–	–	–
50	11/04/2012	26.75500	64.02084	100	Crops	Green	Low	04/02/2012	Low	Dry	Absent	–	–	–	–	–	–	–
51	11/04/2012	26.65167	63.92139	50	Dunes	Drying	Low	04/02/2012	Low	Dry	Absent	–	–	–	–	–	–	–
52	11/04/2012	26.25389	63.98667	50	Dunes	Drying	Low	2012/02/04	Low	Dry	Absent	–	–	–	–	–	–	–

Row	Date	Latitude	Longitude	Area surveyed	Habitat	Vegetation	Vegetation density	Last rain date	Quantity	Soil moisture	Locust Presence	Area infested	Stage	Maturity	Appearance	Behaviour	Population density	To control
53	11/04/2012	26.01417	63.86916	100	Crops	Green	Dense	04/02/2012	Low	Wet	Absent	-	-	-	-	-	-	-
54	11/04/2012	26.05639	63.46833	50	Wadi	Green	Low	04/02/2012	Low	Wet	Absent	-	-	-	-	-	-	-
55	12/04/2012	25.99806	62.94861	20	Crops	Green	Medium	04/02/2012	Moderate	Wet	Absent	-	-	-	-	-	-	-
56	12/04/2012	25.92361	62.72611	50	Plain	Drying	Low	04/02/2012	Moderate	Dry	Absent	-	-	-	-	-	-	-
57	12/04/2012	25.92611	62.60056	100	Crops	Drying	Low	04/02/2012	Moderate	Dry	Absent	-	-	-	-	-	-	-
58	12/04/2012	25.90194	62.51111	100	Plain	Drying	Low	04/02/2012	Moderate	Dry	Absent	-	-	-	-	-	-	-
59	12/04/2012	25.90000	62.61500	50	Crops	Green	Medium	04/02/2012	Moderate	Wet	Absent	-	-	-	-	-	-	-
60	13/04/2012	25.96861	62.90278	50	Hills	Drying	Low	04/02/2012	Moderate	Dry	Absent	-	-	-	-	-	-	-
61	13/04/2012	25.87111	62.73833	50	Hills	Drying	Low	2012/02/04	Moderate	Dry	Absent	-	-	-	-	-	-	-
62	13/4/2012	25.85010	62.7135	100	Crops	Green	Dense	2012/04/02	Moderate	Wet	Present	60 ha	Adult	Mature	Solitary	Isolated	25/ha	No
63	13/04/2012	25.70528	62.62444	500	Plain	Drying	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
64	13/04/2012	25.50722	62.72472	100	Dunes	Drying	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
65	13/04/2012	25.26889	62.45972	100	Dunes	Drying	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
66	14/04/2012	25.25361	62.29000	100	Plain	Drying	Low	31/12/2011	Low	Dry	Absent	-	-	-	-	-	-	-
67	14/04/2012	25.27445	62.12055	500	Plain	Dry	Low	31/12/2011	Low	Dry	Absent	-	-	-	-	-	-	-
68	14/04/2012	25.26417	61.94028	100	Plain	Green	Low	31/12/2011	Low	Dry	Absent	-	-	-	-	-	-	-
69	14/04/2012	25.34611	61.78639	500	Plain	Drying	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
70	14/04/2012	25.38361	61.67500	200	Plain	Drying	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
71	14/04/2012	25.16333	61.82778	300	Plain	Drying	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
72	15/04/2012	25.31806	62.74667	100	Plain	Drying	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
73	15/04/2012	25.32695	62.91111	200	Plain	Drying	Low	04/02/2011	Low	Dry	Absent	-	-	-	-	-	-	-
74	15/04/2012	25.33556	63.12111	300	Plain	Drying	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
75	15/04/2012	25.25722	63.30972	50	Dunes	Drying	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
76	15/04/2012	25.24444	63.22750	50	Dunes	Green	Low	04/02/2012	Low	Wet	Absent	-	-	-	-	-	-	-
77	15/04/2012	25.24639	63.39445	50	Dunes	Drying	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
78	16/04/2012	25.3275	63.40361	50	Crops	Green	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
79	16/04/2012	25.31556	63.22778	500	Plain	Drying	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-

Row	Date	Latitude	Longitude	Area surveyed	Habitat	Vegetation	Vegetation density	Last rain date	Quantity	Soil moisture	Locust Presence	Area infested	Stage	Maturity	Appearance	Behaviour	Population density	To control
80	16/04/2012	25.42306	63.18944	50	Dunes	Drying	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
81	16/04/2012	25.45361	63.19917	50	Crops	Green	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
82	16/04/2012	25.36667	63.18917	10	Hills	Green	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
83	16/04/2012	25.33667	63.18695	20	Plain	Drying	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
84	17/04/2012	25.40500	64.53217	100	Dunes	Drying	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
85	17/04/2012	25.70620	64.5869	500	Plain	Drying	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
86	17/04/2012	25.43833	64.42694	50	Crops	Green	Medium	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
87	17/04/2012	25.27722	64.61139	500	Dunes	Drying	Medium	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
88	17/04/2012	25.34806	64.83194	100	Dunes	Drying	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
89	17/04/2012	25.47056	65.60416	100	Dunes	Drying	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
90	17/04/2012	25.50250	65.73499	100	Dunes	Drying	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
91	17/04/2012	25.45833	66.03861	50	Dunes	Drying	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
92	17/04/2012	25.95254	66.36582	50	Plain	Drying	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
93	17/04/2012	25.69944	66.41222	100	Crops	Green	Medium	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
94	17/04/2012	25.67917	66.54583	50	Plain	Drying	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
95	18/04/2012	25.72361	66.65667	50	Dunes	Dry	Low	2011/09/13	LOw	Dry	Absent	-	-	-	-	-	-	-
96	18/04/2012	25.70695	66.64694	100	Dunes	Dry	Low	2011/09/13	Low	Dry	Absent	-	-	-	-	-	-	-
97	18/04/2012	25.68722	66.65750	30	Dunes	Dry	Low	13/09/2011	Low	Dry	Absent	-	-	-	-	-	-	-
98	18/04/2012	25.64611	66.69611	100	Dunes	Dry	Medium	13/09/2011	Low	Dry	Absent	-	-	-	-	-	-	-
99	18/04/2012	25.59722	66.69611	50	Dunes	Dry	Low	13/09/2011	Low	Dry	Absent	-	-	-	-	-	-	-
100	18/04/2012	25.75691	66.65851	20	Dunes	Dry	Low	13/09/2011	Low	Dry	Absent	-	-	-	-	-	-	-
101	19/04/2012	25.91167	66.60777	100	Plain	Drying	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
102	19/04/2012	26.06028	66.48028	50	Crops	Green	Medium	04/02/2012	Low	Wet	Absent	-	-	-	-	-	-	-
103	19/04/2012	26.27083	66.24721	100	Crops	Green	Dense	04/02/2012	Low	Wet	Absent	-	-	-	-	-	-	-
104	19/04/2012	26.90056	66.30889	100	Hills	Green	Low	04/02/2012	Low	Dry	Absent	-	-	-	-	-	-	-
105	19/04/2012	27.30666	66.36028	100	Crops	Green	Medium	04/02/2012	Low	Wet	Absent	-	-	-	-	-	-	-

#### Appendix 4. Desert Locust Survey Results of I.R. Iran

Row	User ID	Date	Latitude	Longitude	Area surveyed	Habitat	Vegetation state	Vegetation density	Last rain date	Last rain quantity	Soil moisture	Locust Presence	To control
1	9	2012/04/02	28.2841	61.4209	150	Dunes	Dry	Medium	2012/03/28	Low	Dry	Absent	No
2	9	2012/04/02	28.0698	61.4922	200	Plain	Greening	Low	2012/03/28	Low	Dry	Absent	No
3	9	2012/04/02	27.5223	62.1394	200	Plain	Dry	Low	2012/03/28	Low	Dry	Absent	No
4	9	2012/04/02	27.4539	62.2211	150	Plain	Dry	Low	2012/03/28	Low	Dry	Absent	No
5	9	2012/04/02	27.3125	62.0006	200	Plain	Drying	Low	2012/03/28	Low	Dry	Absent	No
6	9	2012/04/02	27.3858	61.8977	200	Dunes	Greening	Medium	2012/03/28	Low	Dry	Absent	No
7	9	2012/04/03	27.4108	61.8670	150	Plain	Dry	Low	2012/03/28	Low	Dry	Absent	No
8	9	2012/04/03	27.4389	61.8320	100	Plain	Drying	Low	2012/03/28	Low	Dry	Absent	No
9	9	2012/04/03	27.4486	61.7600	150	Plain	Drying	Low	2012/03/28	Low	Dry	Absent	No
10	9	2012/04/03	27.4864	61.6989	150	Crop	Green	Dense	2012/03/28	Low	Dry	Absent	No
11	9	2012/04/04	27.2042	61.7497	150	Plain	Greening	Medium	2012/03/28	Low	Dry	Absent	No
12	9	2012/04/04	27.1714	61.7806	100	Plain	Green	Medium	2012/03/28	Low	Dry	Absent	No
13	9	2012/04/04	27.1477	61.5714	100	Plain	Drying	Medium	2012/03/28	Low	Dry	Absent	No
14	9	2012/04/04	27.1391	61.5720	50	Plain	Drying	Medium	2012/03/28	Low	Dry	Absent	No
15	9	2012/04/04	27.2223	61.4809	100	Plain	Drying	Medium	2012/03/28	Low	Dry	Absent	No
16	9	2012/04/05	27.1600	61.1678	50	Dunes	Drying	Low	2012/03/27	Low	Dry	Absent	No
17	9	2012/04/05	27.1817	60.0720	50	Dunes	Drying	Low	2012/03/27	Low	Dry	Absent	No
18	9	2012/04/05	27.1072	59.6603	50	Dunes	Dry	Low	2012/03/27	Low	Dry	Absent	No
19	9	2012/04/05	27.1081	59.4925	100	Dunes	Greening	Low	2012/03/27	Low	Dry	Absent	No
20	9	2012/04/05	27.0358	59.3567	100	Dunes	Greening	Low	2012/03/27	Low	Dry	Absent	No
21	9	2012/04/05	27.1064	58.9798	100	Dunes	Greening	Low	2012/03/27	Low	Dry	Absent	No
22	9	2012/04/05	27.1017	58.8764	100	Dunes	Greening	Low	2012/03/27	Low	Dry	Absent	No
23	9	2012/04/05	27.1256	57.8644	100	Dunes	Greening	Low	2012/03/27	Low	Dry	Absent	No
24	9	2012/04/06	27.5436	59.3092	100	Plain	Dry	Low	2012/03/27	Low	Dry	Absent	No
25	9	2012/04/06	27.5300	59.3003	50	Dunes	Green	Medium	2012/03/27	Low	Dry	Absent	No
26	9	2012/04/06	27.5058	59.2831	200	Plain	Drying	Medium	2012/03/27	Low	Dry	Absent	No
27	9	2012/04/06	27.5736	59.3161	100	Plain	Dry	Medium	2012/03/27	Low	Dry	Absent	No
28	9	2012/04/06	27.4253	59.7889	50	Plain	Dry	Medium	2012/03/27	Low	Dry	Absent	No
29	9	2012/04/06	27.3922	59.9361	100	Plain	Drying	Medium	2012/03/27	Low	Dry	Absent	No
30	9	2012/04/06	26.8533	60.1644	50	Dunes	Green	Medium	2012/03/27	Low	Dry	Absent	No
31	9	2012/04/06	26.8491	60.1503	50	Dunes	Green	Low	2012/03/27	Low	Dry	Absent	No
32	9	2012/04/07	25.5153	60.4706	50	Plain	Dry	Low	2011/12/20	Low	Dry	Absent	No
33	9	2012/04/07	25.4836	60.4866	50	Plain	Dry	Low	2011/12/20	Low	Dry	Absent	No
34	9	2012/04/07	25.4798	60.5522	50	Plain	Drying	Low	2011/12/20	Low	Dry	Absent	No

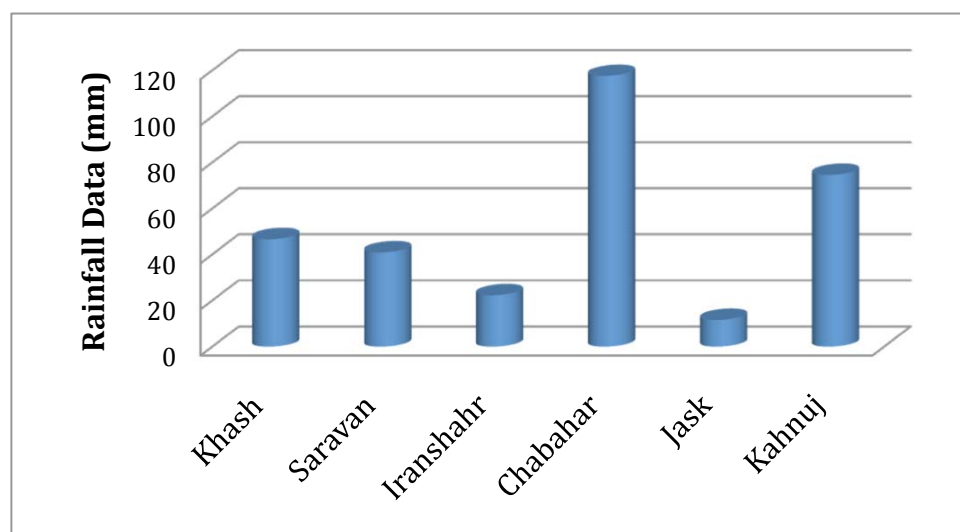
Row	User ID	Date	Latitude	Longitude	Area surveyed	Habitat	Vegetation state	Vegetation density	Last rain date	Last rain quantity	Soil moisture	Locust Presence	To control
35	9	2012/04/07	25.4364	60.6400	50	Plain	Drying	Low	2011/12/20	Low	Dry	Absent	No
36	9	2012/04/08	25.2714	60.7866	50	Dunes	Dry	Low	2011/12/20	Low	Dry	Absent	No
37	9	2012/04/08	25.2664	60.8250	50	Dunes	Dry	Low	2011/12/20	Low	Dry	Absent	No
38	9	2012/04/08	25.2698	60.8430	50	Dunes	Dry	Low	2011/12/20	Low	Dry	Absent	No
39	9	2012/04/08	25.2764	60.8761	50	Dunes	Dry	Low	2011/12/20	Low	Dry	Absent	No
40	9	2012/04/08	25.2309	60.9164	50	Beach	Dry	Low	2011/12/20	Low	Wet	Absent	No
41	9	2012/04/08	25.0344	61.2317	50	Plain	Drying	Low	2011/12/20	Low	Dry	Absent	No
42	9	2012/04/08	25.1633	61.3603	50	Beach	Drying	Dense	2011/12/20	Low	Dry	Absent	No
43	9	2012/04/09	25.3905	60.7684	100	Plain	Dry	Low	2011/12/20	Low	Dry	Absent	No
44	9	2012/04/09	25.4275	60.8144	50	Plain	Dry	Low	2011/12/20	Low	Dry	Absent	No
45	9	2012/04/09	25.4581	60.8430	100	Plain	Dry	Low	2011/12/20	Low	Dry	Absent	No
46	9	2012/04/09	25.4664	60.8181	50	Crop	Green	Low	2011/12/20	Low	Dry	Absent	No
47	9	2012/04/09	25.4622	60.8781	50	Plain	Dry	Low	2011/12/20	Low	Dry	Absent	No
48	9	2012/04/09	25.4050	60.6877	50	Dunes	Dry	Medium	2011/12/20	Low	Wet	Absent	No
49	9	2012/04/10	25.4223	60.8689	50	Plain	Dry	Low	2011/12/20	Low	Dry	Absent	No
50	9	2012/04/10	25.3997	60.8864	50	Plain	Dry	Low	2011/12/20	Low	Dry	Absent	No
51	9	2012/04/10	25.4452	60.9336	50	Plain	Dry	Medium	2011/12/20	Low	Dry	Absent	No
52	9	2012/04/10	25.4231	61.1469	50	Crop	Drying	Medium	2011/12/20	Low	Dry	Absent	No
53	9	2012/04/10	25.3836	61.1214	50	Plain	Drying	Low	2011/12/20	Low	Dry	Absent	No
54	9	2012/04/10	25.4678	60.9377	100	Plain	Drying	Low	2011/12/20	Low	Dry	Absent	No
55	9	2012/04/11	25.4703	60.5025	100	Plain	Dry	Medium	2012/01/23	Low	Dry	Absent	No
56	9	2012/04/11	25.4814	60.4397	50	Plain	Dry	Medium	2012/01/23	Low	Dry	Absent	No
57	9	2012/04/11	25.4745	60.3383	100	Plain	Drying	Medium	2012/01/23	Low	Dry	Absent	No
58	9	2012/04/11	25.5508	60.2547	100	Plain	Dry	Low	2012/01/23	Low	Dry	Absent	No
59	9	2012/04/11	25.5758	60.1722	50	Plain	Dry	Low	2012/01/23	Low	Dry	Absent	No
60	9	2012/04/12	25.5667	60.0686	100	Plain	Dry	Medium	2012/01/23	Low	Dry	Absent	No
61	9	2012/04/12	25.4086	59.9100	50	Plain	Dry	Medium	2012/01/23	Low	Dry	Absent	No
62	9	2012/04/12	25.4756	59.8402	100	Plain	Dry	Low	2012/01/23	Low	Dry	Absent	No
63	9	2012/04/12	25.2644	59.4604	50	Wadi	Green	Medium	2012/01/23	Low	Dry	Absent	No
64	9	2012/04/12	25.4956	59.4511	50	Wadi	Dry	Low	2012/01/23	Low	Dry	Absent	No
65	9	2012/04/12	25.6883	59.1177	50	Plain	Drying	Medium	2012/02/03	Low	Dry	Absent	No
66	9	2012/04/12	25.6619	58.8277	50	Dunes	Dry	Low	2012/02/03	Low	Dry	Absent	No
67	9	2012/04/12	25.7686	58.5972	100	Plain	Drying	Medium	2012/02/03	Low	Dry	Absent	No
68	9	2012/04/12	25.7414	58.1988	50	Plain	Green	Medium	2012/02/03	Low	Dry	Absent	No
69	9	2012/04/13	25.6967	57.8247	50	Plain	Green	Medium	2012/02/03	Low	Dry	Absent	No
70	9	2012/04/13	25.7792	57.7805	50	Dunes	Drying	Medium	2012/02/03	Low	Dry	Absent	No
71	9	2012/04/13	25.8386	57.6658	50	Plain	Drying	Medium	2012/02/03	Low	Dry	Absent	No
72	9	2012/04/13	25.8767	57.5041	50	Dunes	Drying	Low	2012/02/03	Low	Dry	Absent	No
73	9	2012/04/13	26.0097	57.2955	100	Plain	Drying	Medium	2012/02/03	Low	Dry	Absent	No
74	9	2012/04/13	26.8578	57.0730	100	Plain	Drying	Medium	2012/02/03	Moderate	Dry	Absent	No

Row	User ID	Date	Latitude	Longitude	Area surveyed	Habitat	Vegetation state	Vegetation density	Last rain date	Last rain quantity	Soil moisture	Locust Presence	To control
75	9	2012/04/13	26.9233	57.1077	100	Plain	Drying	Low	2012/02/03	Moderate	Dry	Absent	No
76	9	2012/04/16	27.1869	58.5338	50	Dunes	Green	Medium	2012/01/30	Low	Dry	Absent	No
77	9	2012/04/16	27.2036	58.5530	50	Dunes	Green	Medium	2012/01/30	Low	Dry	Absent	No
78	9	2012/04/16	27.2356	58.5855	100	Plain	Green	Medium	2012/04/15	Low	Dry	Absent	No
79	9	2012/04/16	27.1819	58.5691	50	Dunes	Greening	Low	2012/01/30	Low	Dry	Absent	No
80	9	2012/04/16	27.4347	57.9511	100	Plain	Green	Medium	2012/01/29	Low	Dry	Absent	No
81	9	2012/04/16	27.5111	57.9747	100	Plain	Green	Medium	2012/01/30	Low	Dry	Absent	No
82	9	2012/04/17	27.4061	58.3525	100	Plain	Dry	Low	2012/01/30	Low	Dry	Absent	No
83	9	2012/04/17	27.4411	58.3736	100	Plain	Dry	Low	2012/01/30	Low	Dry	Absent	No
84	9	2012/04/17	27.3936	58.4380	100	Plain	Green	Low	2012/01/30	Low	Dry	Absent	No
85	9	2012/04/17	27.4589	58.4988	200	Plain	Green	Medium	2012/01/30	Low	Wet	Absent	No
86	9	2012/04/17	27.4364	58.4877	100	Plain	Dry	Low	2012/01/30	Low	Dry	Absent	No
87	9	2012/04/17	27.3722	58.4136	100	Plain	Dry	Low	2012/01/30	Low	Dry	Absent	No
88	9	2012/04/17	27.3614	58.3611	100	Plain	Green	Medium	2012/01/30	Low	Dry	Absent	No
89	9	2012/04/18	27.8597	57.9802	100	Beach	Drying	Medium	2012/01/30	Low	Wet	Absent	No
90	9	2012/04/18	27.9678	58.0302	50	Dunes	Green	Medium	2012/01/30	Low	Dry	Absent	No
91	9	2012/04/18	27.9411	58.0908	50	Dunes	Green	Medium	2012/01/30	Low	Dry	Absent	No
92	9	2012/04/18	27.7522	58.4597	50	Dunes	Green	Medium	2012/01/30	Low	Dry	Absent	No
93	9	2012/04/18	27.7956	58.5230	50	Dunes	Green	Medium	2012/01/30	Low	Dry	Absent	No
94	9	2012/04/18	27.7750	58.7580	50	Dunes	Drying	Medium	2012/01/30	Low	Dry	Absent	No
95	9	2012/04/19	27.3356	60.1933	100	Plain	Dry	Medium	2012/04/18	Low	Wet	Absent	No
96	9	2012/04/19	27.3528	60.1933	100	Plain	Drying	Medium	2012/04/18	Low	Wet	Absent	No
97	9	2012/04/19	27.2342	60.3375	100	Plain	Drying	Medium	2012/04/18	Low	Wet	Absent	No
98	9	2012/04/19	27.2364	60.4263	100	Plain	Dry	Medium	2012/04/18	Low	Wet	Absent	No

## Appendix 5. Rainfall data

### I.R. Iran (September 2011- May 2012)

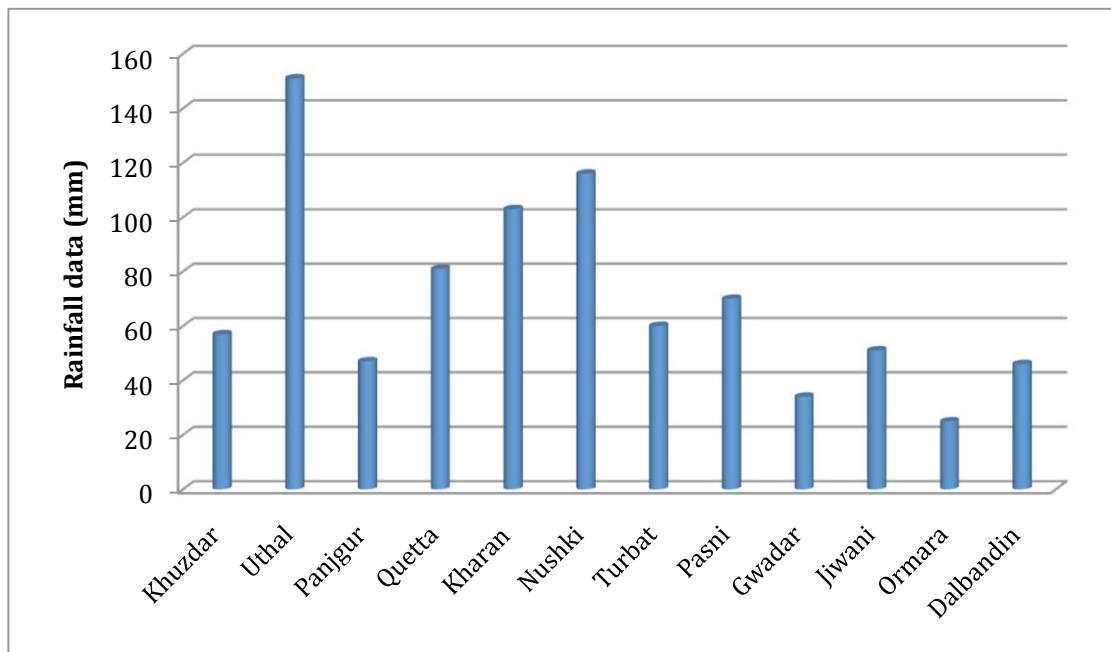
Date	Khash	Saravan	Iranshahr	Chabahar	Jask	Kahnuj
27/09/2011	-	1	-	-	-	-
30/09/2011	-	-	-	33	-	-
31/09/2011	-	-	-	4.5	-	-
<b>Total September</b>	-	1	-	7.5	-	-
06/10/2011	1.2	-	-	-	6.7	5.2
08/10/2011	-	-	-	52	-	-
09/10/2011	-	2	-	-	-	-
23/10/2011	-	-	-	-	-	6.2
24/10/2011	1	-	-	-	-	-
25/10/2011	1.3	-	-	-	-	-
<b>Total October</b>	2.3	2	-	52	6.7	11.4
14/01/2012	-	1.3	-	-	-	-
20/01/2012	-	21.5	-	14.9	2.4	-
21/01/2012	-	10.9	1.2	6.6	-	-
23/01/2012	6.3	-	-	2.5	-	-
<b>Total January</b>	6.3	33.7	1.2	24	2.4	-
02/02/2012	11.6	-	-	-	-	2
14/02/2012	7.8	-	-	-	-	-
16/02/2012	-	-	-	-	-	1.2
17/02/2012	-	-	-	-	-	5
24/02/2012	-	-	-	-	-	13
25/02/2012	1.1	-	-	-	-	31
<b>Total February</b>	20.5	-	-	-	-	39.2
28/03/2012	7.6	2.1	1	-	-	5
<b>Total March</b>	7.6	2.1	1	-	-	5
19/04/2012	7.4	2.1	6.9	2.8	2.5	-
22/04/2012	1.3	-	13.2	1.3	-	-
<b>Total April</b>	7.7	2.1	20.1	4.1	2.5	-
<b>TOTAL</b>	<b>46.6</b>	<b>40.9</b>	<b>22.3</b>	<b>117.6</b>	<b>11.6</b>	<b>74.6</b>



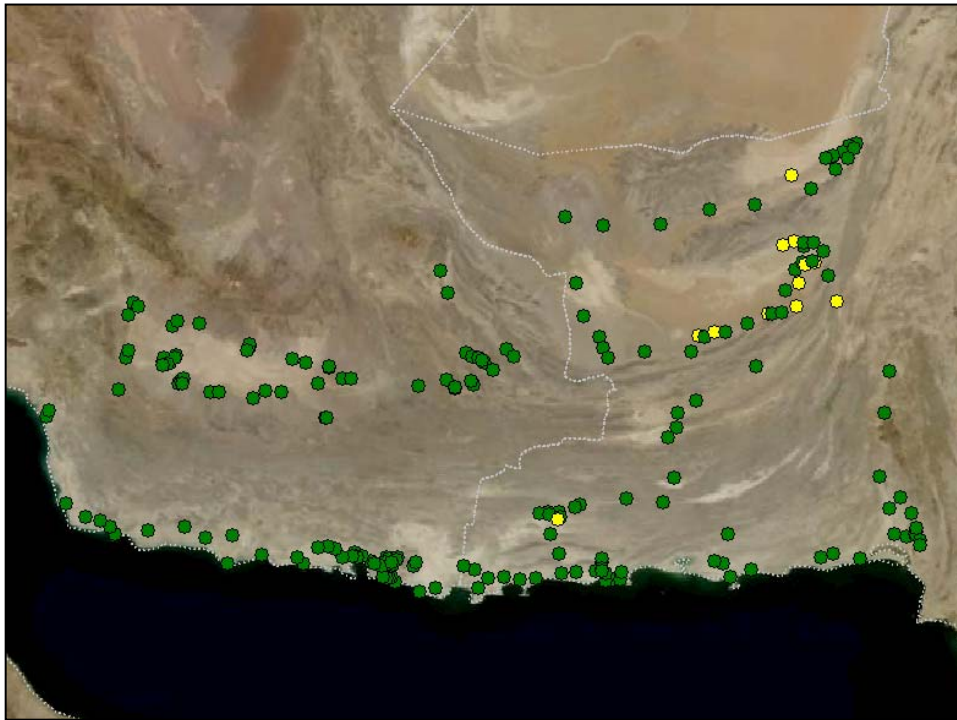


**Pakistan** (September 2011- May 2012)

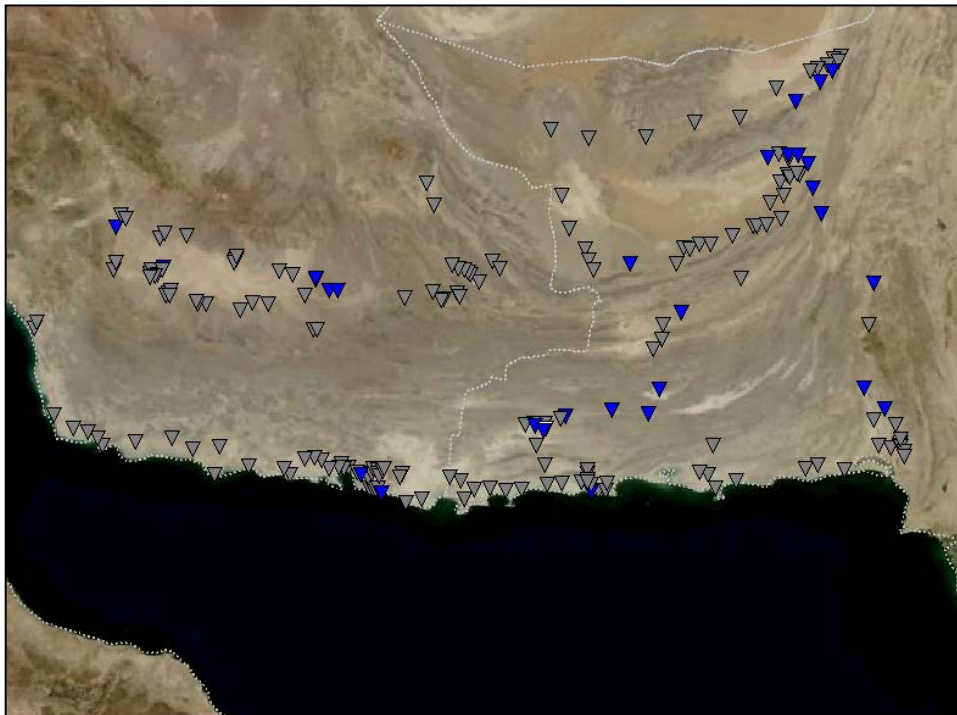
Month	Khuzdar	Uthal	Panigur	Quetta	Kharan	Nushki	Turbat	Pasni	Gwadar	Jiwani	Ormara	Dalbandin
Sep 2011	-	142	-	-	-	-	-	-	-	-	-	-
Oct 2011	-	-	-	-	-	-	-	-	-	-	-	-
Nov 2011	-	-	-	21	-	20	20	16	25	36	-	-
Dec 2011	-	-	-	-	-	20	-	-	-	-	-	-
Jan 2012	15	-	17	16	30	26	-	46	9	15	21	16
Feb 2012	3	2	25	28	20	4	40	8	-	-	4	-
Mar 2012	14	-	-	-	18	16	-	-	-	-	-	-
Apr 2012	25	7	5	16	35	30	-	-	-	-	-	30
Total	57	151	47	81	103	116	60	70	34	51	25	46



## Appendix 6. Survey maps



**Locust results.** Survey stops where Desert Locust were present (yellow) and absent (green).



**Soil moisture.** Survey stops where the soil was moist (blue) and dry (gray).

## Appendix 7. Photos



Using GPS and forms in I.R. Iran (270623N/585847E, Baleshti)



Dry conditions on the Vashnam Plains in I.R. Iran (252804N/605616)



Survey in the Jaz Murian Basin, I.R. Iran (272732N/582956E, Godar)



Sand dune area in Solan, I.R. Iran (271055N/583409E)



Sand dunes near Pasni, Pakistan



Checking green habitat for solitary locust by Pakistan Team leader





Dry vegetation between Kharan and Panjgur, Pakistan



Checking soil moisture near Pasni coast by Pakistan Team leader



Entering survey results into eLocust in Jolge Chah Hashem, I.R. Iran (270936N/611004E)



Sandy terrain between Dalgan and Iranshahr, I.R. Iran (273425N/591858E, Dalgan)



Solitary adult locust seen near Nushki, Pakistan



Moist soil near Chabahar, I.R. Iran (251351N/605459E, Kachu)



I.R.Iran Joint Survey Team (*left to right*): Taghibaygi (Driver), Ali Babali (Team Leader), Qulam Kazemi (Driver), Qulam Hossein Taymori (Locust Officer), Amiri Nejad (Locust Assistant)



Pakistan Joint Survey Team: Saeed Ahmed (Mechanic/driver), Nazeer Ahmed (Driver), Wali Muhammed (Locust Officer), Alif Khan (Team Leader), Muhammed Saleem (Maintenance Asst.)

## Appendix 8. Itinerary for 2013

Day	Date	Option A (normal joint survey) route	Night halt
1	01/04/2013	I.R. Iran team cross into Pakistan at Mirjaveh	Taftan
2	02/04/2013	Taftan, Dalbandin, Chagi Hills, Nushki	Nushki
3	03/04/2013	Nushki, Kharan, Kharan area (Naroo)	Kharan
4	04/04/2013	Kharan area (Shamsi – Borko)	Kharan
5	05/04/2013	Kharan area (Ormage and Sole area)	Kharan
6	06/04/2013	Kharan, Basima, Nag, Panjgur	Panjgur
7	07/04/2013	Panjgur, Prome, Panjgur	Panjgur
8	08/04/2013	Panjgur, Hoshab, Turbat	Turbat
9	09/04/2013	Turbat, Solaika, Turbat	Turbat
10	10/04/2013	Turbat, Suntsar, Gwader	Gwader
11	11/04/2013	Gwader, Jiwani, Gwader	Gwader
12	12/04/2013	Gwader, Kulanch, Pasni	Pasni
13	13/04/2013	Pasni area	Pasni
14	14/04/2013	Pasni, Ormara, Uthal	Uthal
15	15/04/2013	Uthal, Khuzdar, Quetta	Quetta
16	16/04/2013	Report day, prepare 1 <sup>st</sup> half joint survey results	Quetta
17	17/04/2013	Quetta, Nushki, Taftan	Taftan
1	18/04/2013	Both teams cross border point Taftan/Mirjaveh	Zahedan
2	19/04/2013	Zahedan, Khash, Gosht, Saravan	Saravan
3	20/04/2013	Saravan, Souran, Zaboli, Iranshahr	Iranshahr
4	21/04/2013	Iranshahr, Jolgeh Chah Hashem, Iranshahr	Iranshahr
5	22/04/2013	Iranshahr, Espakeh, Nikshahr, Chahbahar	Chahbahar
6	23/04/2013	Chahbahar, Beris, Sham, Govater, Chahbahar	Chahbahar
7	24/04/2013	Chahbahar, Vashnam, Dashtiari, Negur, Chahbahar	Chahbahar
8	25/04/2013	Chahbahar, Zarabad, Jask area	Jask
9	26/04/2013	Jask, Minab, Bandar Abbas	Bandar Abbas
10	27/04/2013	Report day, prepare 2 <sup>nd</sup> half joint survey results	Bandar Abbas
11	28/04/2013	B.Abbas, Ghale Ganj, Sowlan, Ghale Ganj	Ghale Ganj
12	29/04/2013	Ghale Ganj , East Jaz Murian, Ghale Ganj	Ghale Ganj
13	30/04/2013	Zeh Kalout, Dalgan, Sangar, Sardegah, Bampour, Iranshahr	Iranshahr
14	01/05/2013	Iranshahr, Zahedan, send 2 <sup>nd</sup> half results	Zahedan
15	02/05/2013	Locust Heads/ JS team meeting, prepare JS report	Zahedan
16	03/05/2013	Locust Heads/ JS team meeting, prepare JS report	Zahedan
17	04/05/2013	Zahedan, Mirjaveh; Pakistani Team cross the border	



Day	Date	Option B (separate survey) route: I.R. Iran	Night halt
1	01/04/2012	Start joint survey	Zahedan
2	02/04/2012	Zahedan → Khash → Gosht → Saravan	Saravan
3	03/04/2012	Saravan → Soran → Saravan	Saravan
4	04/04/2012	Saravan → Zaboli → Iranshahr	Iranshahr
5	05/04/2012	Iranshahr → Jolgeh Chah Hashem → Dalgan	Dalgan
6	06/04/2012	Dalgan → Dalgan area → Iranshahr	Iranshahr
7	07/04/2012	Iranshahr → Espake → Nikshahr → Chabahar	Chabahar
8	08/04/2012	Chabahar → E Vashnam → Kambel → Kohdim → Chabahar	Chabahar
9	09/04/2012	Chabahar → W Vashnam → Maleki → Berijdar → Afkan → Chabahar	Chabahar
10	10/04/2012	Chabahar → Beris → Sham → Govatr → Chabahar	Chabahar
11	11/04/2012	Chabahar → Konarak area → Chabahar	Chabahar
12	12/04/2012	Chabahar → Zarabad → Jask	Jask
13	13/04/2012	Jask area	Jask
14	14/04/2012	Jask → Jask Kohneh → Koh Mobarak → Minab → Bandar Abbas	Bandar Abbas
15	15/04/2012	Report day for first half of survey results	Bandar Abbas
16	16/04/2012	Bandar Abbas → Manujan → Ghale Ganj → Solan → Ghale Ganj	Ghale Ganj
17	17/04/2012	Ghale Ganj → W Jaz Murian → Ghale Ganj	Ghale Ganj
18	18/04/2012	Ghale Ganj → E Jaz Murian → Zehkalot → Dalgan	Dalgan
19	19/04/2012	Dalgan → Sangan → Sardegal → Bampour → Iranshahr	Iranshahr
20	20/04/2012	Iranshahr → Zahedan	Zahedan
21	21/04/2012	Report day for second half of survey results	Tehran
22	22/04/2012	Iranian Locust Head travels to Zahedan (or Karachi)	Zahedan/Karachi
23	23/04/2012	Locust Heads / JS team meeting to exchange views and information	Zahedan/Karachi
24	24/04/2012	Locust Heads / JS team meeting to prepare JS report	Zahedan/Karachi
25	25/04/2012	Locust Heads / JS team meeting to submit JS report	Zahedan/Karachi
26	26/04/2012	Iranian Locust Head & Team Leader return to Tehran	

*N.B. In case of unnecessarily high travel costs and visa difficulties to allow the Iranian Locust Head and Team Leader to participate in the JS Team Meeting in Karachi, the meeting venue can be changed to Zahedan, I.R. Iran at the discretion of the SWAC Secretary and in consultation with both countries.*

Day	Date	Option B (separate survey) route: Pakistan	Night halt
1	01/04/2013	Quetta → Nushki area → Nushki	Nushki
2	02/04/2013	Nushki → Dalbandin → Nokundi → Nushki	Nushki
3	03/04/2013	Nushki → Kharan → Ormagai area → Kharan	Kharan
4	04/04/2013	Kharan → Haji Chah → Jamak → Kharan	Kharan
5	05/04/2013	Kharan → Ziarat → Shamsi → Washuk	Washuk
6	06/04/2013	Washuk → Palantak → Mashkhel → Washuk	Washuk
7	07/04/2013	Washuk → Borko	Borko
8	08/04/2013	Borko → Basima → Nag → Panjgur	Panjgur
9	09/04/2013	Panjgur → Prome area → Panjgur	Panjgur
10	10/04/2013	Panjgur → Hoshab area → Turbat	Turbat
11	11/04/2013	Turbat → Solaika area → Turbat	Turbat
12	12/04/2013	Turbat → Sunstar area → Gwadar	Gwadar
13	13/04/2013	Gwadar → Jiwani → Gwadar	Gwadar
14	14/04/2013	Report day for first half of the survey	Gwadar
15	15/04/2013	Gwadar → Kolanch area → Pasni	Pasni
16	16/04/2013	Pasni → Pasni area → Pasni	Pasni
17	17/04/2013	Pasni → Ormara coastal area → Uthal	Uthal
18	18/04/2013	Uthal → Uthal area → Uthal	Uthal
19	19/04/2013	Uthal → Wadh → Khuzdar	Khuzdar
20	20/04/2013	Khuzdar → Qallat area → Quetta	Quetta
21	21/04/2013	Report day for second half of the survey & winding up	Quetta
22	22/04/2013	Pakistan Locust Head and Team Leader travel to Zahedan (or Karachi)	Zahedan/Karachi
23	23/04/2013	Locust Heads / JS team meeting to exchange views and information	Zahedan/Karachi
24	24/04/2013	Locust Heads / JS team meeting to prepare JS report	Zahedan/Karachi
25	25/04/2013	Locust Heads / JS team meeting to submit JS report	Zahedan/Karachi
26	26/04/2013	Locust Head & Team Leader return to Karachi	

*N.B. In case of unnecessarily high travel costs and visa difficulties to allow the Iranian Locust Head and Team Leader to participate in the JS Team Meeting in Karachi, the meeting venue can be changed to Zahedan, I.R. Iran at the discretion of the SWAC Secretary and in consultation with both countries.*