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Urkurkar, J. S.; Koshta, V. K.; Naidu, Diwakar; and Sastri, A. S. R. A. S., "Localized Severe Drought during 1996 and Its Impact on Crop Production in Raipur District of Central India" (1997). *Drought Network News (1994-2001)*. 87.

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Localized Severe Drought during 1996 and Its Impact on Crop Production in Raipur District of Central India

In Raipur district, the onset of the monsoon occurred in the 25th standard meteorological week (June 18–24). But after the onset of monsoonal rains, there was a lull in the monsoon for about 2 consecutive weeks. In the 28th week (July 9–15), the district received 77.6 mm of rainfall. This was equal to the normal value for that week. In the following (29th) week, the district received 96.8 mm rainfall, 38.9% more than the normal rainfall for that week.

Thus, the rice, soybean, and other crops sown with the onset of the monsoon in the 25th week suffered from acute water shortage during the 26th and 27th weeks (June 25–July 8), and the germination of these crops was affected. Those farmers who had resown their crop received good rainfall during the 28th and 29th weeks (July 9–22). In the 32nd week, there was a total rainfall of 258.4 mm at Labhandi, Raipur, compared to the weekly normal of 77.1 mm. However, out of this, 222.0 mm of rainfall was received in only one day—July 31/August 1, 1996. Because the rice seedlings were very small at that stage, most farmers drained the water out of their fields.

Until the end of September 1996, there was a total rainfall of 1,016.2 mm rainfall at Raipur. The average value for this period is 1,192.5 mm, which shows that the rainfall received at Raipur was almost normal, with 15% deficiency. But the situation was not the same everywhere in the district. Due to the absence of any disturbance or cyclonic storm in the Bay of Bengal, there was no widespread rainfall in the district after the onset of the monsoon. Instead, there was scattered rainfall due to local thunderstorm activities and, as a result, there were large deficit rainfall conditions in some pockets of Raipur district.

The monthly rainfall for June–September at some stations in Raipur district is shown in Table 1.

There was deficit rainfall in all stations of Raipur district during June and July 1996. During August, the situation improved in many places, including Raipur. But in Abhanpur, Tilda, Baloda, Bazar, and Palari, the situation did not improve in August, and in these blocks the rainfall was deficient from June to August. Again in September, there was a deficit rainfall pattern in most of the stations. In Arang, Abhanpur, Tilda, Balodabazar, Palari, and Nagri

Block	June			July			Aug.			Sept.			Total		
	1996	Normal	D	1996	Normal	D	1996	Normal	D	1996	Normal	D	1996	Normal	D
Dharsiwa	93.8	177.5	-47	160.6	342.7	-53	493.7	348.7	+41	136.9	185.9	-26	885.0	1054.8	-16
Arang	43.6	242.6	-82	229.9	393.5	-42	355.8	389.6	-9	89.7	227.6	-61	719.0	1253.3	-43
Abhanpur	46.0	219.5	-73	264.0	370.8	-29	295.0	389.1	-24	111.0	213.1	-48	716.0	1192.5	-40
Tilda	97.3	87.5	-45	358.0	352.7	+4	223.4	358.7	-36	80.5	195.9	-57	759.2	1013.0	-24
Balodazabar	39.0	201.7	-81	258.7	388.6	-33	278.3	404.4	-31	53.0	195.1	-73	629.0	1189.8	-47
Bhatapara	45.0	177.5	-75	198.5	342.7	-42	394.2	348.7	+13	148.6	185.9	-20	786.3	1132.3	-30
Palari	68.5	219.5	-69	225.6	370.8	-39	255.7	389.1	-34	57.2	213.1	-73	607.0	1148.3	-42
Simga	45.5	177.5	-74	289.5	342.7	-16	407.7	348.7	+1	189.1	185.9	+2	931.8	1054.8	-12
Dhamtari	65.0	227.8	-71	283.7	390.7	-27	664.3	411.5	+61	182.7	225.5	-18	1195.7	1141.0	+4
Kurud	60.0	198.4	-70	338.0	341.1	-1	539.0	375.7	+43	109.0	194.1	-44	1046.0	1109.3	-6
Nagri	78.2	227.8	-66	259.2	390.7	-33	468.0	411.5	+13	110.6	225.5	-50	916.0	1141.0	-20
Labhandi (Raipur)	88.4	219.5	-60	263.1	370.8	-29	466.7	389.1	+20	198.0	213.0	-7	1016.2	1192.5	-15

D = Departure from normal (%)

Table 1. Monthly rainfall at different blocks of Raipur district during 1996 and their corresponding normal values and percentage departures.

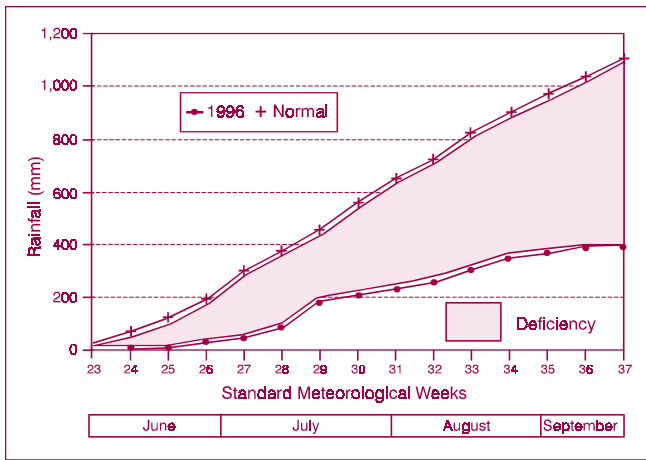


Figure 1. Cumulative weekly rainfall pattern during June 4–September 16, 1996, compared to normal values, at Mahasamund, India.

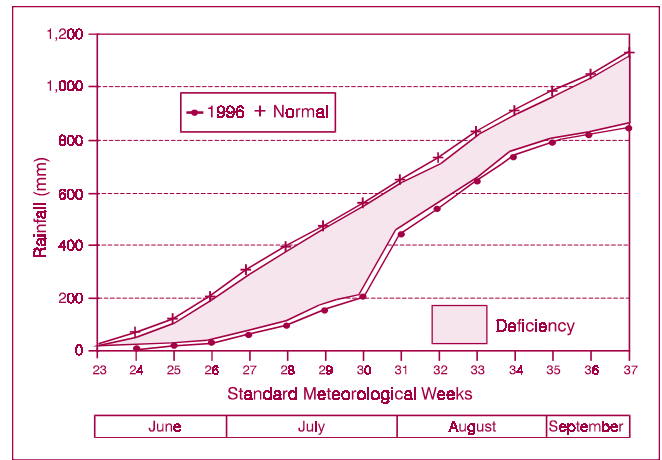


Figure 2. Cumulative weekly rainfall pattern during June 4–September 16, 1996, compared to normal values, at Fingeshwar, India.

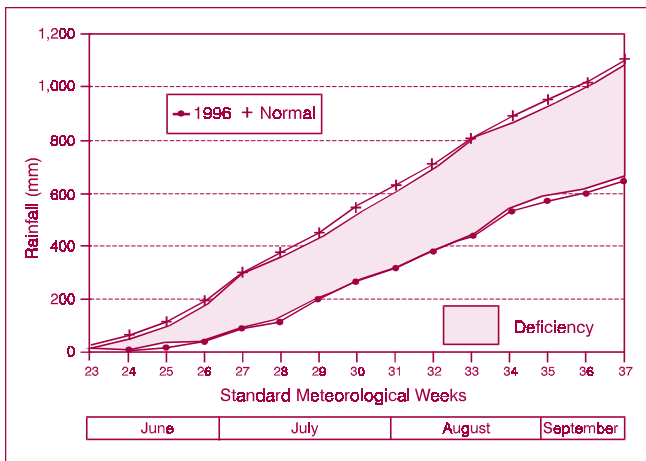


Figure 3. Cumulative weekly rainfall pattern during June 4–September 16, 1996, compared to normal values, at Kasdol, India.

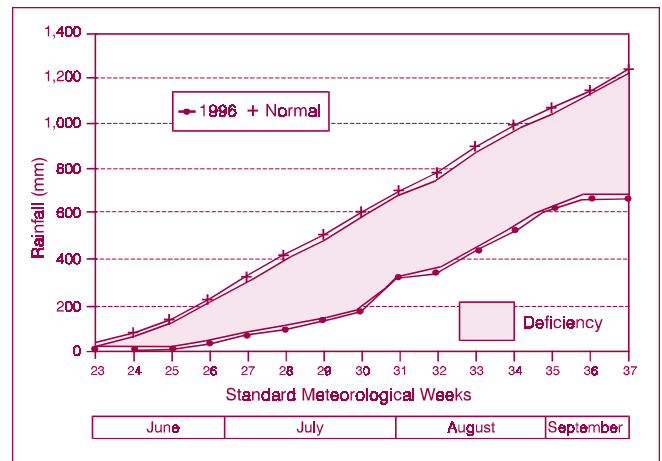


Figure 4. Cumulative weekly rainfall pattern during June 4–September 16, 1996, compared to normal values, at Chura, India.

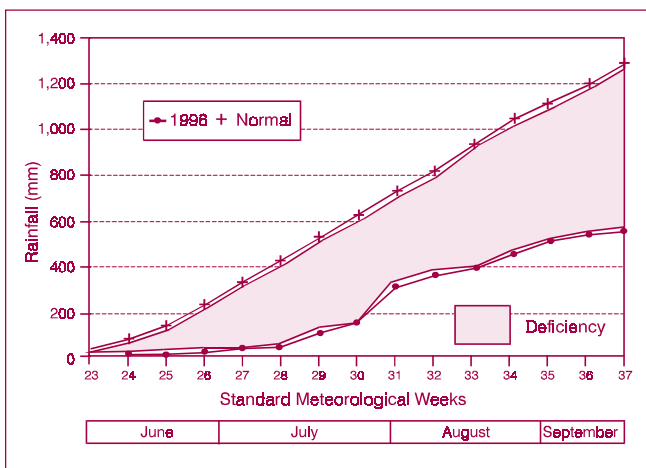


Figure 5. Cumulative weekly rainfall pattern during June 4–September 16, 1996, compared to normal values, at Gariyaband, India.

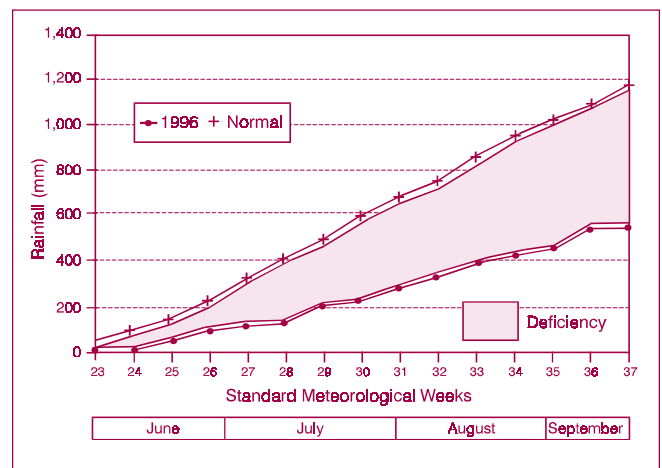


Figure 6. Cumulative weekly rainfall pattern during June 4–September 16, 1996, compared to normal values, at Bagbahra, India.

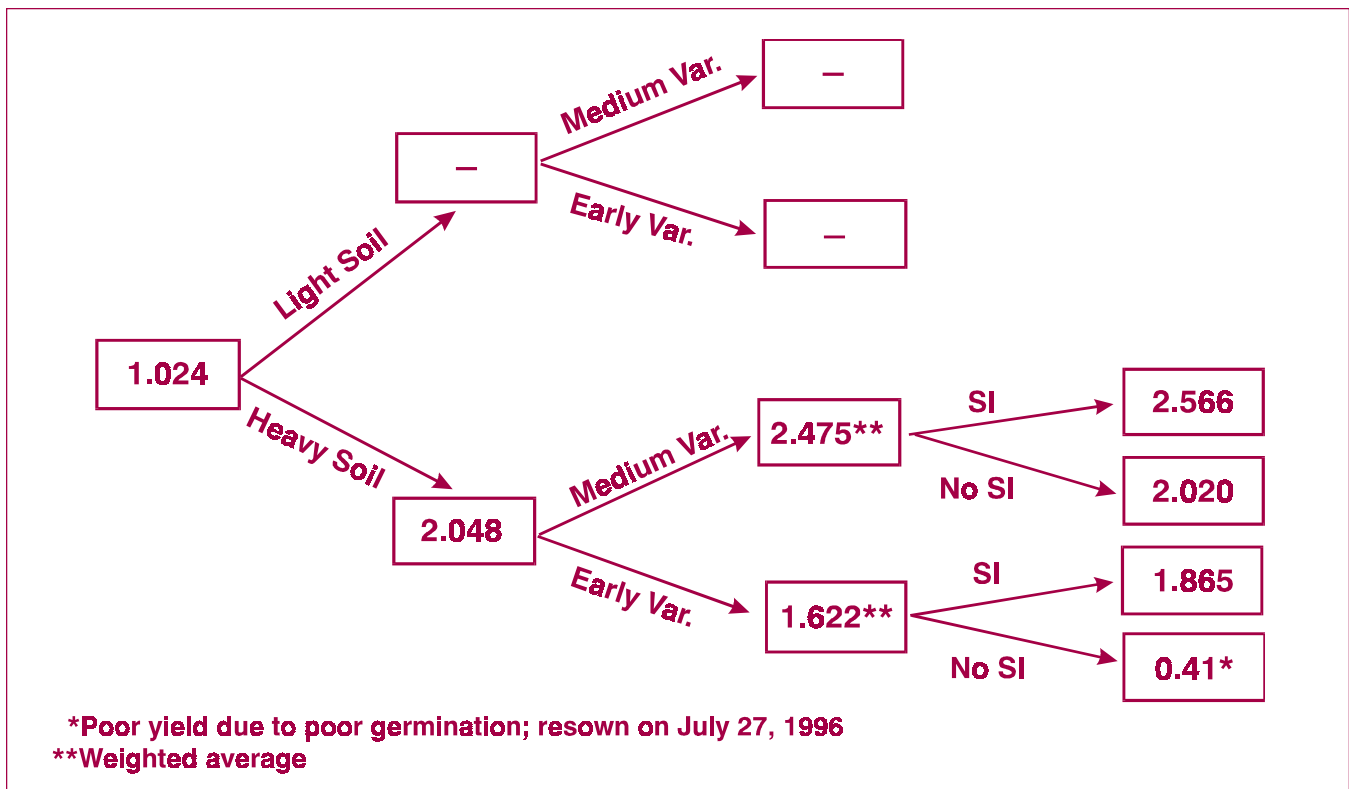


Figure 7. System analysis for productivity (t/ha) of early- and medium-duration rice varieties under severe drought conditions in two types of soil. SI = supplemental irrigation.

blocks, September rainfall was deficient by 48%–73%. Overall, from June to September in Arang, Abhanpur, Balodabazar, and Palari blocks, rainfall was less than 60% of normal. Considering $\pm 19\%$ rainfall deviation as normal, the stations that received normal rainfall until September 1996 were Dharsiwa, Simga, Dhamtari, Kurud, and Raipur. Thus, out of 12 stations, only 5 received normal rainfall ($\pm 19\%$) for June–September 1996. Cumulative rainfall and water deficit patterns for some stations for June–September are shown in Figures 1–6.

Rice Productivity

On-farm experiments in collaboration with the International Rice Research Institute (IRRI) under the International Fund for Agricultural Development (IFAD) program were conducted during the 1996 rainy season at Tarpongi Village (30 km. north of Raipur). Because of a severe, prevailing drought in

the village, the rice fields were completely infested with weeds, and the majority of farmers left their fields unweeded. In the on-farm experimental fields, too, the rice crop failed in light soils. In heavier soils, the crop could withstand the drought conditions. A few farmers provided supplementary life-saving irrigation with water that accumulated in roadside ditches. This irrigation increased the yields of medium-duration varieties by up to 27%. But in the case of early-maturing varieties, the plant population was badly affected, and resown crops also experienced severe conditions; hence productivity further decreased in fields with no supplementary irrigation. The results of the experiments are shown in Figure 7.

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