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## INTENSITY OF IRRIGATION IN JAMMU PROVINCE

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### Abstract

*The main objective of this paper is to assess the temporal and spatial variations in the intensity of irrigation in Jammu region from 1990-91 to 2000-2001. It is an established fact that the intensity of irrigation cannot be uniform in any agricultural region. This fact assumes more significance in the region where there are great variations not only in physiographic and drainage patterns but also in climatic and agro-climatic conditions. Kuhl, canal and tube-wells are the main sources of irrigation in the region. In 1990-91, Jammu region has the highest intensity of irrigation (19.13 per cent) which was the lowest in 1995-96 (17.08 per cent) but in 2000-2001 it could marginally improve to 18.22 per cent. After calculating the intensity of irrigation the study area has been divided into the regions of intensity of irrigation. Further, the study also attempts to analyze the changes that have occurred over space and in time.*

### Introduction

Irrigation denotes the supply of water by man-made means to regulate the growth of plants ( Soundaram 1994 ) Irrigation is an important technological factor influencing the agriculture in a positive manner . The man , in one form or the other had been practicing irrigation much before the advent of modern civilization For instance in Egypt, it goes back to 4000 B.C or beyond and in other parts of the world it is equally old . ( Singh and Dhillon 1994) In the modern times it has generally been recognized beyond any doubt that Irrigation plays a pivotal role in enhancing agricultural production and diversification. It not only encourages the farmers to go to intensive farming but also to increase land use efficiency. However, Irrigation presents a combination of the opportunities and problem of water management in both the humid and semi-arid

regions ( Brady 1990 ). It has generally been recognized that farming without irrigation in dry lands is an uneconomic venture (Hooda 1990). Thus, in the Indian conditions where monsoon rain is erratic both in time and amount irrigation assumes greater significance (Siddiqi 1998). It can thus be said that the farmers of a region, where assured irrigation is available, are not only innovative and progressive but engage themselves more vigorously with agricultural operations. Therefore, this leads to enhance the productivity of land and improves the quality of the produce. Obviously, irrigation helps to develop the agriculture in more than one way. Apart from making the deficiency of soil moisture, it ensures the sustained and proper growth of agricultural crops. If the land is provided with assured irrigation the risk involved in the safe harvest are eliminated. Irrigation increases the intensity of agriculture



besides enhancing the productivity. It also encourages the cultivation of marketable agricultural crops and is capable of vertical expansion of land and multiple cropping.

In Jammu province temperature conditions favour cultivation of crops throughout the year but due to non-availability of moisture in the soil the plant growth is limited. Monsoon provides sufficient water from July to September provided it is normal but in case the monsoon failure most of the cropped area suffers from damage. In winter this region also receives several showers of rain due to western disturbances. The remaining months of the year are mostly dry. Another important feature of agriculture in the study region is that the man has answered physiographic constraints by carving out terraced fields on the slopes of the mountains and hills but answer to dry spells of climate lies in making some the arrangement for irrigating as water is a life giving agent to plants. The spatial and temporal requirement of moisture differs with different crops. In a region where moisture availability from precipitation is inadequate to meet the natural needs of the crops, irrigation becomes the best alternative to make up the deficiency. In this context an attempt is being made to understand the status of irrigation in Jammu province of Jammu and Kashmir state by calculating and mapping the intensity of irrigation.

### **Study Area**

The Jammu province stretches from 32°- 17' N to 34°- 12' N latitude and 73°- 58' E to 76°- 47' E longitude. Nestled against the backdrop of the snow capped Pir Panjal mountains, the region constitutes the southern most unit of the state. It extends between the middle Himalayan ranges in the north and the dusty plains of Punjab in the south. Between these two extremes lie a series of scrub-

covered hills, forested mountain ranges and the river valleys, encompassing several micro-climatic regions that extend from Kishtwar in the north-east to Akhnoor in the south-west and the historic town of Poonch in the north-west to the borders of Kangra ( H.P ) in the south-east. The Shivalik hills cut across the area from the east to the west while the river Ravi, Tawi, and Chenab cut their valleys through the region. Jammu province covers an area of 26293 sq. km. which is one-eighth of the total area of the state. Administratively, within the actual line of control ( ALC ) Jammu province is divided into six districts namely, Jammu, Kathua, Udhampur, Doda, Rajouri and Poonch. It also has 57 blocks and 3617 villages. Further these districts have been divided into 30 tehsils. The region, occupies a strategic location since it lies in the south-west. On the north it touches the beautiful valley of Kashmir and cold deserts of Ladakh. Altitudinally, the region extends from 300 metres above mean sea level in the outer plains to over 5000 metres in Middle Himalayas. Barring the high mountains and steep slopes the climate of Jammu province is characterized by a seasonal rhythm which is caused by the reversal of winds in the form of the south-west and the north-east monsoons. The province is situated in the humid sub-tropical monsoon type of climate. However, it extends to the sub-temperate to temperate and even to alpine types of climates. Relief is a major factor in determining the degree of temperature and rainfall intensity. In such a diverse region diversification in agriculture is evident.

### **Methodology**

It is a tehsil level study and depends upon published and unpublished data collected from the revenue department of Jammu province. The data were first processed and subsequently presented by suitable choropleth

maps. The intensity of irrigation has been calculated by the following formula:

$$\text{Intensity of Irrigation} = \frac{\text{Gross Irrigated Area}}{\text{Net Sown Area}} \times 100$$

Using the above methodology, the study region has been divided into areas of very high, high, medium and low intensity of irrigation.

## Results and Discussion

### Areas of Very High Intensity of Irrigation

Table 1 and 2 clearly show that R.S Pura, Akhnoor and Bishnah are the three tehsils

which form a region where intensity of irrigation is very high. The intensity of irrigation in R.S Pura tehsil never fell below 75.23 per cent (1995-96) and touches 83.36 per cent in 2000-2001 (Table 1). A close scrutiny of Table 1 rather closely we find that in Akhnoor tehsil the least intensity is witnessed in 1990-91 (69.92 per cent) and it touches a maximum limit of 71.79 per cent in 2000-2001. Bishnah tehsil, no doubt, forms the part of the region where intensity of irrigation is very high but it lags behind R.S Pura and Akhnoor tehsils where intensity of irrigation has always remained almost twice as much as recorded by Bishnah tehsil (Figs. 1,2,3).

**Table 1**  
**Jammu Province: Intensity of Irrigation.**

S.No.	Tehsils	1990-1991	1995-1996	2000-2001	Change in 1990-2001
1	Jammu	19.46	28.31	18.11	-1.35
2	Samba	23.37	26.17	25.47	2.1
3	R.S. Pura	80.81	75.23	83.36	2.55
4	Akhnoor	69.92	70.20	71.79	1.87
5	Bishnah	34.05	37.61	35.81	1.76
6	Ramnagar	19.88	20.80	18.21	-1.67
7	Udhampur	19.70	19.39	19.39	-0.31
8	Reasi	16.27	16.31	18.97	2.7
9	Goolgulabgarh	14.98	14.87	16.50	1.52
10	Chenani	18.96	20.76	19.54	0.58
11	Kishtwar	N A	N A	N A	N A
12	Bhaderwah	N A	N A	N A	N A
13	Doda	10.39	10.33	10.45	0.06
14	Ramban	6.34	6.37	6.38	0.04
15	Banihal	26.53	27.40	19.95	-6.58
16	Thathri	10.51	10.57	10.46	-0.05
17	Bhalessa	N A	N A	N A	N A
18	Budhal	3.87	4.48	3.89	0.02
19	Kalakote	6.48	6.43	6.31	-0.17
20	Nowshera	4.60	4.66	4.41	-0.19
21	Rajouri	8.88	8.82	8.43	-0.45
22	Sunderbani	5.88	6.56	5.95	0.07
23	Thanamandi	5.17	5.44	5.78	0.61
24	Billawar	3.78	4.24	3.48	-0.30
25	Basohli	3.49	4.42	4.45	0.96
26	Kathua	25.03	22.47	25.07	0.04
27	Hiranagar	18.90	18.15	20.15	1.25
28	Poonch	5.09	5.49	5.07	-0.02
29	Mendhar	3.85	4.69	3.45	-0.40
30	Surankote	6.94	4.90	5.44	-1.5
<b>Total Jammu Province</b>		<b>19.13</b>	<b>17.08</b>	<b>18.22</b>	<b>- 0.91</b>

Source: Study Report on Urban Sprawl and Land use/Land cover mapping for NCR- NRSA-1999.

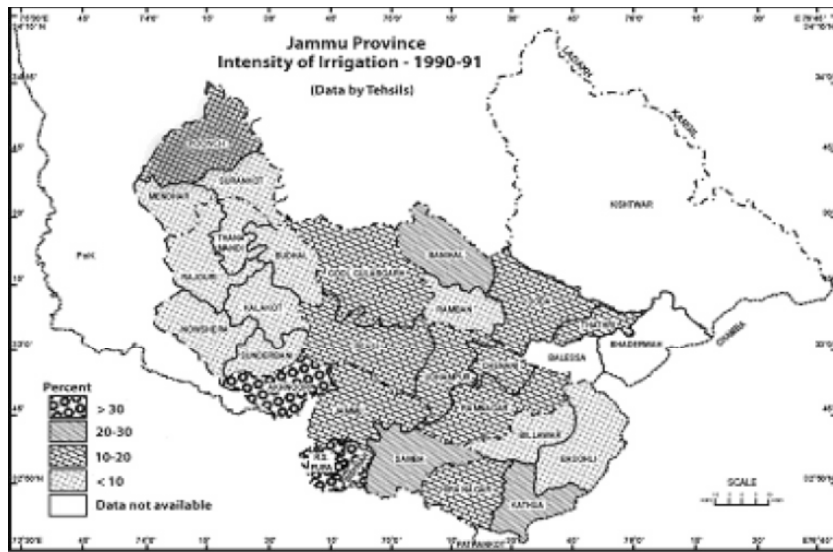


Fig.1

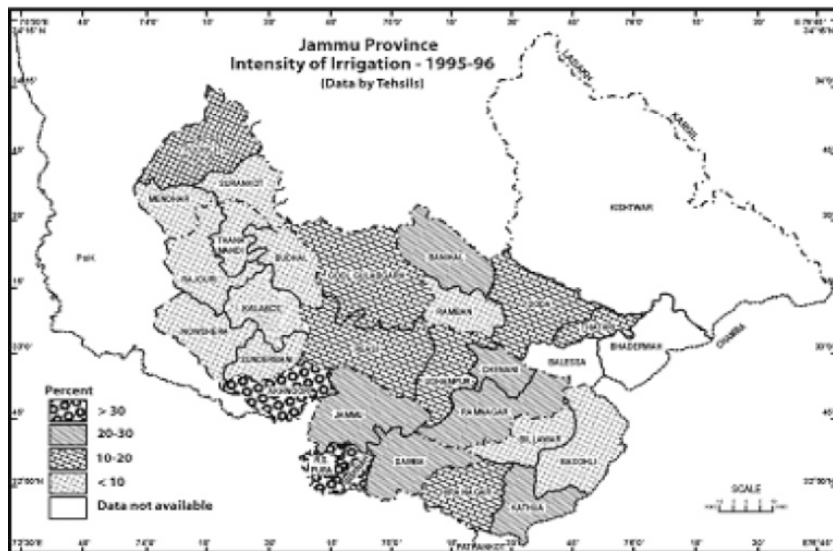


Fig. 2

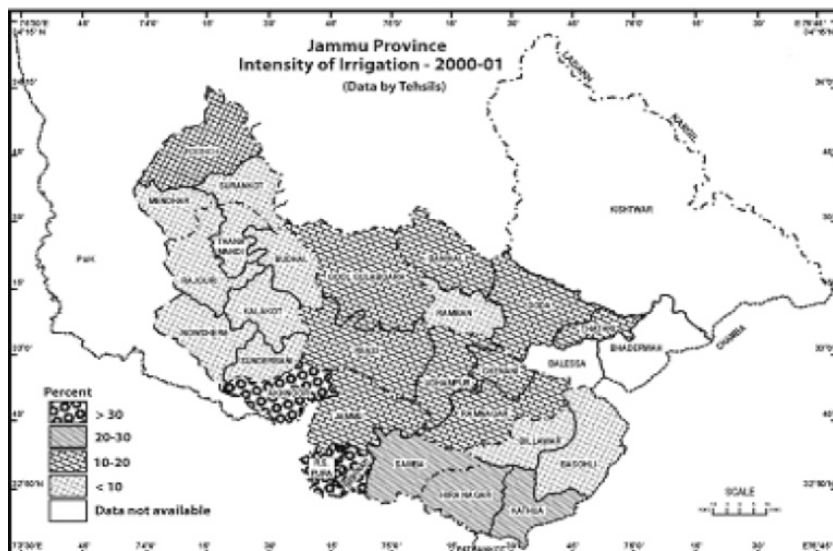


Fig. 3

### Areas of High and Medium Intensity of Irrigation

There have been glaring variations over space and time in the region of high ( 20-30 per cent ) and medium ( 10-20 per cent ) intensity of irrigation. Samba, Banihal and Kathua are the three tehsil where intensity of irrigation is found high both in 1990-91 and 1995-96 but Banihal is replaced by Hiranagar in 2000-2001. Chenani, Jammu and Ramnagar tehsils which formed the part of medium intensity of irrigation in 1990-91 has joined Samba, Kathua and Banihal in 1995-96 to form a region of high intensity of irrigation . But these three tehsils (Jammu, Ramnagar and Chenani) failed to retain their status in 2000-2001 and returned to the region of medium intensity of irrigation .

The spatial and temporal variations in the region forming medium intensity of irrigation are sharper. There are five tehsils viz Udhampur, Reasi, Goolgulabgarh, Doda and Thathri which remained the part of medium

intensity of irrigation region throughout the study period. Hiranagar remained the part of this region during 1990-91 and 1995-96 but moved , as stated , earlier to a region of high intensity of irrigation in 2000-2001 (Table 2). Similarly Banihal which was the part of the region where the intensity of irrigation was high in 1990-91 and 1995-96 failed to retain its status and moved to the region of medium of intensity irrigation in 2000-2001(Figs. 1,2,3)

### Areas of Low Intensity of Irrigation

The largest number of tehsils form the part of this region which shows that large areas of the study region have less than 10 per cent of their net sown area under irrigation. Important fact that emerges from the study of Table 1 is that 12 out of the 27 tehsils (data for 3 tehsils were not available) for which the data are available for 1990-91 , 1995-96 and 2000-2001 formed a region of low intensity of irrigation. It means that less than 10 per cent of their total net

**Table 2**  
**Jammu Province: Intensity of Irrigation**

S.no	Category	1990-91 Name of the Tehsils	No. of Tehsils	1995-96 Name of the Tehsils	No. of Tehsils	2000-01 Name of the Tehsils	No. of Tehsils
1.	Very High >30 per cent	R.S.Pura, Akhnoor, Bishnah	3	R.S.Pura, Akhnoor, Bishnah	3	R.S.Pura, Akhnoor, Bishnah	3
2.	High 20-30 per cent	Samba, Banihal, Kathua	3	Jammu, Samba, Ramnagar, Chenani, Banihal, Kathua	6	Samba, Kathua, Hiranagar,	3
3.	Medium 10-20 per cent	Jammu, Ramnagar, Udhampur, Reasi, Goolgulabgarh, Chenani, Doda, Thathri, Hiranagar	9	Udhampur, Reasi, Goolgulabgarh, Doda, Thathri, Hiranagar	6	Jammu, Ramnagar, Udhampur, Reasi, Goolgulabgarh, Chenani, Doda, Banihal, Thathri	9
4.	Low < 10 per cent	Ramban, Budhal, Kalakote, Nowshera, Rajouri, Sunderbani, Thanamandi, Billawar, Basohli, Poonch, Mendhar, Surankote	12	Ramban, Budhal, Kalakote, Nowshera, Rajouri, Sunderbani, Thanamandi, Billawar, Basohli, Poonch, Mendhar, Surankote	12	Ramban, Budhal, Kalakote, Nowshera, Rajouri, Sunderbani, Thanamandi, Billawar, Basohli, Poonch, Mendhar, Surankote	12
Total			27		27		27

Source: Table 1

sown area is irrigated. Thus it can be concluded that the tehsils of outer plain region of the state in general and of the study area in particular are falling in the region of either high or very high intensity of irrigation. The particular mention in this regard may be made of the tehsils of R.S Pura, Bishnah, Akhnoor, Hiranagar, Kathua, Jammu and Samba. As we move towards mountainous rugged areas the intensity of irrigation declines and as such we find that the tehsils of Udhampur, Reasi, Goolgulabgarh, Doda, Ramnagar etc located in Shivaliks and middle mountains fall either in the region of medium or low intensity of irrigation. The 12 tehsils namely, Ramban, Budhal, Kalakote, Nowshera, Rajouri, Sunderbani, Thanamandi, Billawar, Basohli, Poonch, Mendhar and Sura which recorded low intensity of irrigation show no temporal variations. However, the tehsils

where intensity falls in medium category show variation over time. Five tehsils of Udhampur, Reasi, Goolgulabgarh, Doda, and Thathri always remained in the medium class of intensity of irrigation while Jammu, Ramnagar joined this group in 1990-91, 2000-01, Hiranagar in 1990-91 and 1995-96 and Chenani in 1990-91 and 2000-01. Banihal which was the part of region where intensity of irrigation was high in 1990-91 and 1995-96 failed to maintain its level in 2000-01 and joined the region of medium intensity of irrigation. This clearly shows the control of physiography over the intensity of irrigation (Figs.1, 2, 3)

The above discussion can not be complete without going into the further details of the range within which the intensity of irrigation in the study region lies. Among the tehsils having irrigation intensity above 30 per

**Table 3**  
**Jammu Province: Change in Intensity of Irrigation**

S.No.	(+Change) Category	Name of the Tehsils	No. of Tehsils	(- Change) Category	Name of the Tehsils	No. of Tehsils
1	No Change	---	---	No Change	---	---
2	<1% Marginal	Chenani, Doda, Ramban, Budhal, Sunderbani, Thanamandi, Basohli, Kathua	8	<1% Marginal	Udhampur, Thathri, Kalakote, Nowshera, Rajouri, Billawar, Poonch, Mendhar	8
3	1-2% Small	Akhnoor, Goolgulabgarh, Hiranagar, Bishnah	4	1-2% Small	Jammu, Ramnagar, Surankote	3
4	>2% Large	Samba, R.S. Pura, Reasi	3	>2% Large	Banihal	1
<b>Total</b>			<b>15</b>			<b>12</b>

Source: Table 1



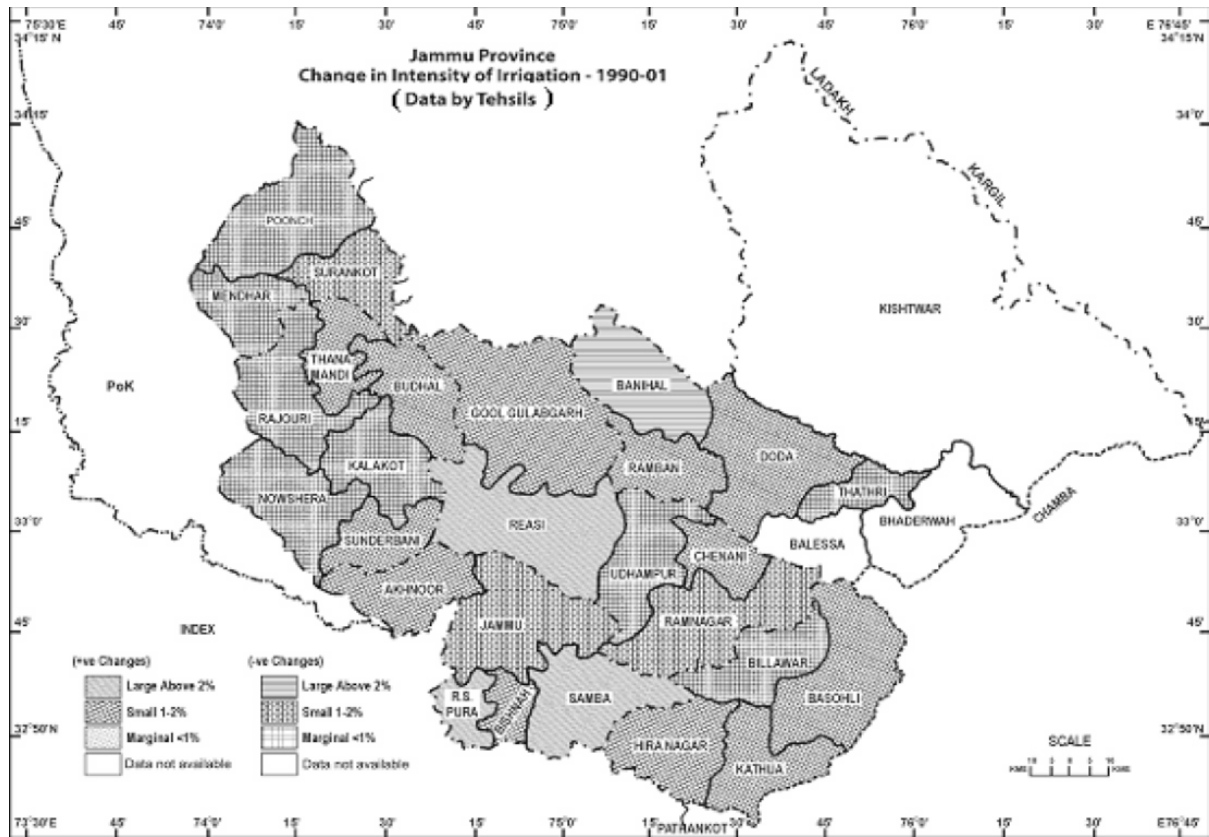


Fig. 4

cent, we find that R.S. Pura tehsil has recorded the highest intensity throughout the period under investigation. Even in this tehsil intensity varies over the time as it was 80.81 per cent in 1990-91 which was reduced to 75.23 per cent during 1995-96 but in 2000-2001 again went up to 83.36 per cent. R.S. Pura is distantly followed by Akhnoor tehsil with corresponding percentages of 69.92, 70.23 and 71.79 respectively during the study period. On the other hand irrigation intensity touched the lowest levels in Budhal, Billawar and Mendhar tehsil with less than 5 per cent throughout the period under study.

From the above discussion one thing becomes very clear that due to number of controlling factors such as physiography, climate, and drainage the intensity of irrigation has not and rather cannot remain static over the time. There are certain tehsils where there has been a marginal (< 1 per cent) small (1-2 per

cent) and large (> 2 per cent) change either in positive or negative direction (Table 3). Chenani, Doda, Ramban, Budhal, Basohli, Sunderbani, Thanamandi and Kathua are the tehsils where a marginal but positive change of less than 1 per cent has been recorded in 2000-2001 as compared to 1990-91. Similarly Udhampur, Thathri, Kalakote, Nowshera, Rajouri, Billawar, Poonch and Mendhar tehsils have shown a downward trend of less than 1 per cent in their intensity of irrigation during this period. Akhnoor, Bishnah, Goolgulabgarh and Hiranagar are the four tehsils where a positive change of 1-2 per cent has been seen but Jammu, Ramnagar and Surankote tehsils are the areas where intensity of irrigation has declined by small margin of 1-2 per cent over the period under investigation. There are three tehsils where intensity of irrigation increased positively by over 2 per cent (Table 3). These tehsils are Samba, R.S. Pura and Reasi but in



Banihal tehsil intensity of irrigation exhibits a negative change of more than 2 per cent (Fig 4)

### Conclusion

Though irrigation is required for every crop cultivated in the region yet its intensity is chiefly governed by physiographic factors. As a result in the outer plain region it is very high (R.S.Pura, Akhnoor, Bishnah, tehsils) but as one moves to the hilly (Shivaliks) and mountainous areas the intensity of irrigation gradually declines. The entire western part of the study region comprising the tehsils of Sunderbani, Kalakote, Nowshera, Rajouri, Thanamandi, Budhal, Mendhar, Surankote and Poonch and two tehsils namely Billawar and Basholi forming the eastern part of the region always remained under low intensity of irrigation mainly due to physical constraints. The man has responded to this situation by cultivating paddy in the former and maize in the latter region as the major crops. The paddy needs high degree of irrigation while maize can grow and ripe without irrigation if the monsoon are normal. However, there is a need and scope for increasing the intensity of irrigation. A number of measures are required to be adopted. The already existing canals, distributaries and their channels in the outer plains need to be lined to make the water for irrigation available at the tail end areas. Kuhls in the hilly and mountainous region need immediate attention of irrigation department for repair. A lot of precious water resource flows down from the small rivulets without being used and as such kuhls need to be constructed in order to increase the intensity of irrigation.

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