COTTON IRRIGATION REGIME UNDER CONDITIONS OF REGULATED WATER DEFICIT

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Herewith investigate set the task of ascertaining of rational irrigation regime under conditions of regulated water deficit for cotton

In terms of ***temperature*** years
- 2001and 2003 were warm,
- 2002 and 2006 – moderate, and
- 2004-2005 – cool years.

The ***rainfall sum*** for the period May – August characterized years
- 2001 and 2006 as dry,
- 2002 and 2003 as moderate, and
- 2004 and 2005 – moderately humid.

Sum of air temperatures (°C) in the period of cotton vegetation (2001-2006)

Years	Period of cotton vegetation, months							Sum	
	IV	V	VI	VII	VIII	IX	X	V-VIII	V-X
2001	348	512	615	778	791	615	459	2996	3770
2002	321	527	663	741	673	525	394	2604	3523
2003	298	585	685	739	772	539	387	2781	3707
2004	381	470	599	714	686	560	433	2469	3462
2005	364	552	587	690	684	545	357	2513	3415
2006	362	512	600	688	751	555	433	2551	3539
1928-2007	357	524	624	722	694	561	425	2564	3550

Sum of precipitations (*mm*) in the period of cotton vegetation (2001-2006)

Years	Period of cotton vegetation - months							Sum	
	IV	V	VI	VII	VIII	IX	X	V-VIII	V-X
2001	72	60	31	24	7	70	3	122	195
2002	67	29	17	176	35	50	53	257	360
2003	55	73	33	106	10	28	82	222	332
2004	18	93	136	30	73	40	19	332	391
2005	18	50	73	158	52	92	45	333	470
2006	67	19	33	67	49	40	17	168	225
1928-2007	45	62	66	54	42	34	38	224	298

The *soil type* was leached vertisols with humus horizon – 70-115 cm, with humus content of 1.8 – 3.5 %, clay minerals 60 % and wilting moisture 18-20 %.

FMC for layer 0-50 cm was 34.2 %, 51-100 cm was 31.6 % and 101-200 cm – 28.7 %.

The *productive moisture* for layer 0-60 cm was 96 mm, for 0-100 cm was 181 mm and 101-200 cm – 99 mm.

Field trial on cotton (Perla cultivar) was carried out during the 2001-2006 period under irrigation regime of sprinkling – 75 % of the field moisture capacity (FMC) for the soil layer of 0-40 cm.

The trial included the following *variants*:

- Two irrigations of 400 mm per hectare – the first one at the bud formation stage and the second – at the blooming stage;
- Two irrigations of 400 mm – the first one at the blooming stage and the second – at the boll formation stage;
- Single irrigation of 500 mm at the blooming stage;
- Single irrigation of 600 mm at the blooming – boll formations period;
- Non-irrigated variant – standard.

RESULTS AND DISCUSSIONS

The ***highest September yield*** was realized by variant 1 – average of 2042 kg/ha (99.1 %), 361 kg more than the non-irrigated cotton and 112-259 kg more than the other variants

The irrigation effect expressed in increase of total seed-cotton yield was strongly dependant on the rainfall and temperature in the cotton vegetation period.

During the dry years 2001 and 2006 the yield increase was an average of 51.2-53.9 % for variants with two irrigations, while for single irrigation in the period of mass blooming was from 21.1 to 30.4 %

During the moderately humid years (2002-2003) the yield increase was with an average of 34.5 % or 930 kg/ha more than the variant with two irrigations of 400 m^3/ha performed at the cotton bud formation and blooming stages.

From the other variants was obtained 21.7 – 25.0 % higher yield as compared to the non-irrigated control.

The irrigation effect was smallest in the humid years – 2004 and 2005.

Given in percentage of the non-irrigated control, the yield increase was from 9.0 to 27.9 %.

The effect of 1000 m^3 irrigation water per 1 ha, expressed in additional yield of kilograms of cotton, obtained with additional yield of kilograms of cotton obtained as a result of the irrigation depends on the year rainfall and temperature.

This effect was greatest for the dry and warm years and varied from 586 to 1163 kg/ha.

Average for the period the highest values were obtained by the variant with two irrigations of 40 mm done in the bud formation and flowering stages.

Cotton yield and effect of 1000 m^3 irrigated water, *kg/ha*

Variants	Dry years		Moderately humid years		Humid years		Average for 6 years	
	Yield	Effect	Yield	Effect	Yield	Effect	Yield	Effect
V_1	2919	1065	3629	1163	2152	586	2767	934
V_2	2565	1123	3285	733	2015	415	2621	751
V_3	2174	1014	3373	1348	1835	304	2460	880
V_4	2085	697	3351	1087	1931	413	2456	727
St	1667	-	2699	-	1683	-	2020	-

CONCLUSIONS

- Under conditions of regulated water deficit, the highest effect was provided by irrigation regime of 75 % FMC in soil layer 0-40 cm, which was realized in two irrigations with irrigation rate of 400 mm in the phenophasis of bud formation and blooming.
- Average for 6 years with this irrigation regime the total cotton yield increased with 747 kg/ha or with 36.0 %, including increase of 51.2 % in dry years.
- This irrigation regime was characterized with the highest effect of 1000 m^3 irrigation water – average with 934 kg/ha.