

1.4. Irrigation regime and water consumption norms for maize for grain and green mass

Information on irrigation regime and water consumption norms for maize for grain and green mass is represented within the IPTRID register over 3 pilot plots: in the Republic of Uzbekistan "Tinchlic" collective farm (1.04. Uzb) which is located in Yangiul rayon, Tashkent oblast; in the Republic of Tajikistan-"K. Marx" (1.05. Tajik) and "Turkmenistan" (1.06. Tajik) collective farms which are located in Gissar valley. Experiments on maize for grain and green mass irrigation regimes were carried out over the plots 1.04.Uzb, 1.05. Tajik, and for hybrids ЮЗПСК-104 and ВІР-156ТВ on the site 1.06. Tajik. On the site "K. Marx" collective farm maize for grain was sowed after winter barley (2-nd yield), and for green mass after winter wheat. All mentioned pilot plots are represented by automorphous gray soils with natural high drainability. According to water allowance zoning all plots relate to zone III. Over the sites experiments were conducted according to general methodology, i.e. were multi-variant and variants differed by various values of pre-irrigation moisture. For the site 1.04.Uzb values of pre-irrigation moisture were 60 x 70 x 60, 70 x 70 x 60 and 80 x 80 x 60% of full field water capacity and for 1.05. Tajik and 1.06. Tajik - 60 x 60 x 60, 70 x 70 x 70, 80 x 80 x 80 and 70 x 70 x 70, 70 x 80 x 70, 80 x 80 x 70% of full field water capacity.

Control variant is the production experiment of maize irrigation which was conducted according to agro-recommendations. Over the variants calculated layer is 1 meter of soil thickness. Depth of irrigations were calculated by moisture deficit in calculated layer. Basic results of investigations on irrigation regimes and norms of water consumption over mentioned pilot plots and experiments are represented in table 1.4.1. As a result of

Table 1.3.3

Water balance of winter wheat and barley pilot plots and distribution on the elements

# #	Indicators of irrigation regime and water consumption elements assessment	1.04.Uz. «Tinchlik», Tashkent province				1.03.Tad. (SPA experimental plot)			
		control	60x70x60	70x70x60	80x80x80	according to recommendations	60x60x60	70x70x70	80x80x80
Water balance components									
1.	Inflow, m ³ /ha, including:	7950		7400		6046	4519	4885	5180
2.	Precipitation, m ³ /ha	2550		2550		2276	2276	2276	2276
3.	Share of precipitation within inflow, %	32,1		34,5		37,6	50,4	46,6	43,9
4.	Water supply, net, m ³ /ha	4090		3550		<u>2952^x</u> 4014	<u>1405^x</u> 1868	<u>2092^x</u> 2740	<u>2416^x</u> 3116
5.	Share of water supply, %	51,4		47,9		48,8	31,1	42,8	46,6
6.	Water stock in soil, m ³ /ha	1300		1300		818	838	517	487
7.	Percentage	16,4		17,6		13,5	18,5	10,6	9,4
8.	Discharge, m ³ /ha	7950		7400		<u>6046</u> 7278	<u>4519</u> 4982	<u>4885</u> 5533	<u>5180</u> 5879
9.	- Total evaporation (water consumption), m ³ /ha	7950 (2850)		7400 (2800)		6046	4519	4885	5180
10.	- Infiltration from water supply, %					14-22	13-21	11-19	11-17
11.	- Surface release from water supply, %					11-19	10-16	8-16	8-14

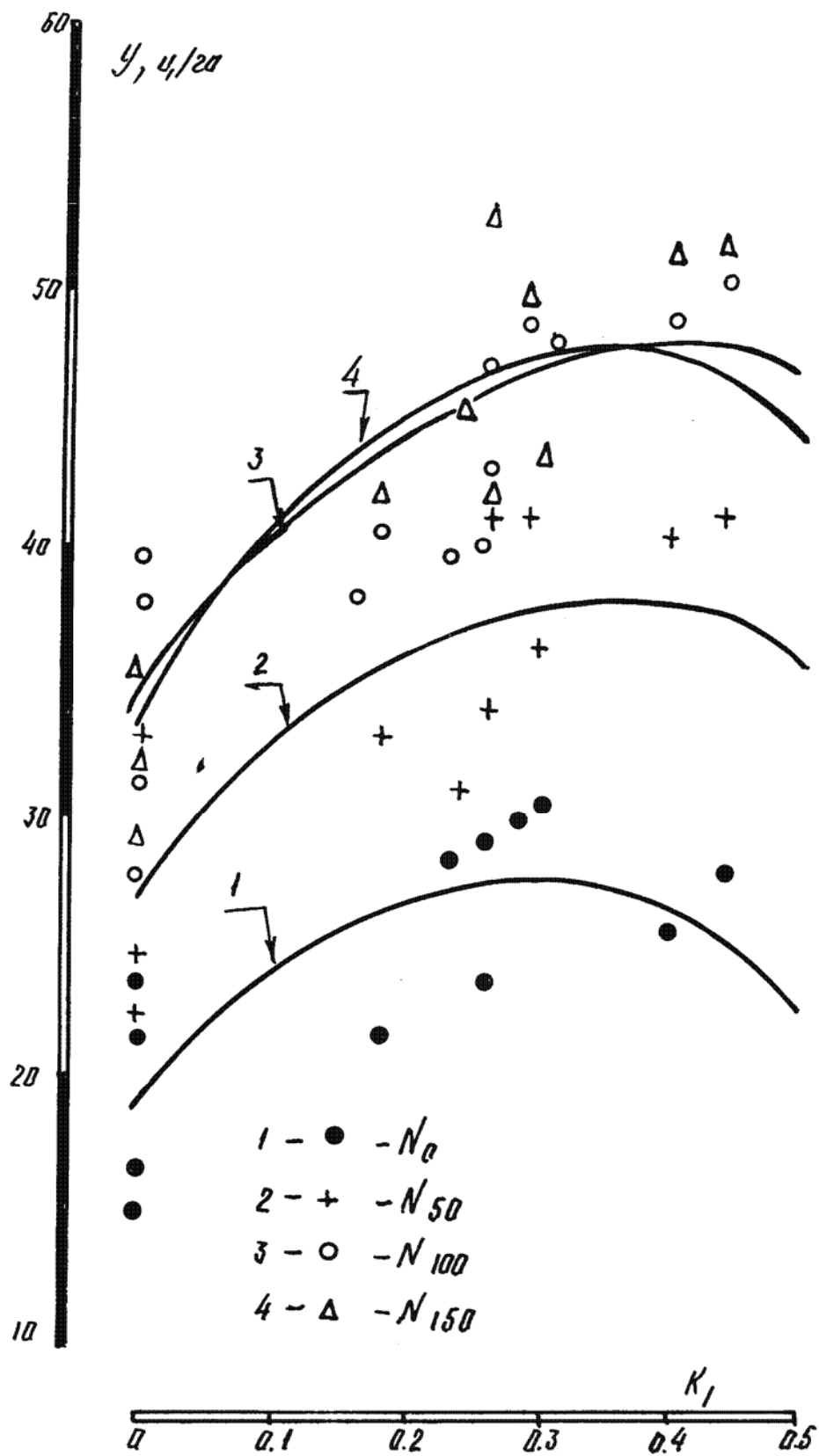
x - numerator - net, denominator - gross of field

Table 1.4.1

Main output of field investigations of irrigation regime and water consumption norms for maize for grain and silo

##	Indicators of effective irrigation regime and water consumption norm assessment	Codes of pilot projects and options of irrigation regime							
		1.04.Uz. collective farm Tinchlik, Tashkent province				1.05.Tad. collective farm K.Marx			
		Control	60x70x60	70x70x60	80x80x80	Agro-recommendations	60x60x60	70x70x70	80x80x80
1.	Irrigation norms, m ³ /ha	1172-1216	965-1023	774-857	687-711	652	1069	849	613
2.	Number of waterings	3	3	4	5	5	4	5	7
3.	Irrigation norm for grain, m ³ /ha	3583	2966	3300	3600	3262	4275	4275	4290
4.	Grain yield, c/ha	67,3	65,3	80,1	95,16	56,4	53,7	67,4	65,5
5.	Specific water expenses per production unit for grain, m ³ /c	53,2	45	41	38	58	80	63	65
6.	Grain water consumption, m ³ /ha	5662	5219	5206	5512	4333	3288	4254	4536
7.	Water specific expenses, m ³ /c	84,1	79,9	64,9	57,9	76,8	61,2	63,1	69,2
8.	Irrigation norms, m ³ /ha	1172-1216	965-1023	774-857	687-711	1092	1011	767	553
9.	Number of waterings	3	3	4	5	5	3	5	8
10.	Irrigation norm for grain, m ³ /ha	3583	2966	3300	3600	5461	3034	3836	4421
11.	Grain yield, c/ha	289	273	306	336	388	302	406	465
12.	Specific water expenses per production unit, m ³ /c	12,4	10,9	10,8	10,7	14,1	10,0	9,4	9,5

# #	Indicators of effective irrigation regime and water consumption norm assessment	Codes of pilot projects and options of irrigation regime							
		1.02. Tad. collective farm Turkmenistan, gibrade specific ЮЗПСК-704				1.02. Tad. collective farm Turkmenistan, gibrade specific ВИП-156ТВ			
		Agro-recommendations	70x70x70	70x80x70	80x80x70	Control	70x70x70	70x80x70	80x80x80
1.	Irrigation norms, m ³ /ha	922	798	667	634	883	890	707	597
2.	Number of waterings	5	7	9	10	5	6	8	10
3.	Irrigation norm for grain, m ³ /ha	4609	5587	6003	6335	4416	5341	5654	5968
4.	Grain yield, c/ha	63	89,7	104,9	109,5	46,7	63,8	75,9	74,1
5.	Specific water expenses per production unit for grain, m ³ /c	73	62	57	58	95	84	74,5	80,5
6.	Grain water consumption, m ³ /ha	6345	7258	7414	7546	5945	6693	6888	6935
7.	Water specific expenses, m ³ /c	100,7	80,9	70,7	68,9	127,3	104,9	90,7	93,6



Dr. 1.3.1. Wheat yield versus K_1 value under different norms of nitrogenic fertilizers on typical serozems of north-Tyrkestan system (III-hydromodule rayon), K_1 -bioclimatic coefficient.

comparison of materials on irrigation regime efficiency indices, water consumption norms for various automorphous soils, optimal values of pre-irrigation moisture were established under which maximum yield of maize for grain and green mass was achieved with minimum water expenses.

For lands which are represented by typical gray soils (1.04.Uzb) above mentioned values of pre-irrigation moisture of full field water capacity on maize for grain and green mass are optimal. Moisture 80x80x60% within the root zone is kept through water supply by depth of 650-710 m³/ha with number of irrigations-5. Irrigation norm during vegetation period is 3600 m³/ha. Under this variant of irrigation regime was achieved the following:

- high yield of maize for grain and green mass. Yield of maize for grain varied from 89 to 102 c/ha (95,16 c/ha on average for 3 years), and for green mass -329-340 c/ha (336 c/ha on average for 3 years). In the control variant the average yield for 3 years was 67,3 c/ha, and for green mass 289, i.e. on 24,86 c/ha less for wheat and 47 c/ha less for green mass (table 1.4.1);

- lowest specific water expenses. Expenses for grain and green mass growing were 38 m³/c and 10,7 m³/c, on other variants they varied from 41 to 53,2 m³/c and from 10,8 to 12,4 m³/c for green mass (table 1.4.1). For brown-carbonate soils, dark and light gray automorphous soils the irrigation regime providing pre-irrigation moisture 70x70x70% of full field water capacity (1.05.Tajik) and 70x80x70% (1.06.Tajik) within the root zone is optimal. Under this irrigation regime the indices of effective irrigation was obtained;

- low irrigation norms -4254-6000 m³/ha for maize for grain and 3836 m³/ha for green mass was supplied over field through 4-8 waterings by depth 767-900 m³/ha; in other variants irrigation norm was 4300-7500 m³/ha;

- high yield of grain and green mass. Grain yields under these variants of regime over the plot 1.05.Tajik was 67 c/ha ; 1049 c/ha (hybride ЮЗПСК) and (ВИР-156ТВ) on plot 1.06. Tajik; over the plot 1.05.Tajik under irrigation norm 3836 m³/ha 406 c/ha on maize for green mass was achieved.

- lowest water expenses for yield unit cultivation, which varied from 57-63 m³/c to 84 m³/c (hybrid АЕД-156ОА) for maize for grain and 24 m³/c for green mass.

- field and plot water balance over the variants is found stable. The main positive element in balance over the plots is water supply (net). The main negative element in balance is total evaporation (water consumption). Water expense for biomass formation and physical evaporation reached 79-96%, excluding the variant 60x60x60 over the plot 1.05.Tajik where it is equal 62,3%. Losses share for release and percolation varied from 4 to 20,2% , from which about 50% were spent for direct release (1.4.2).