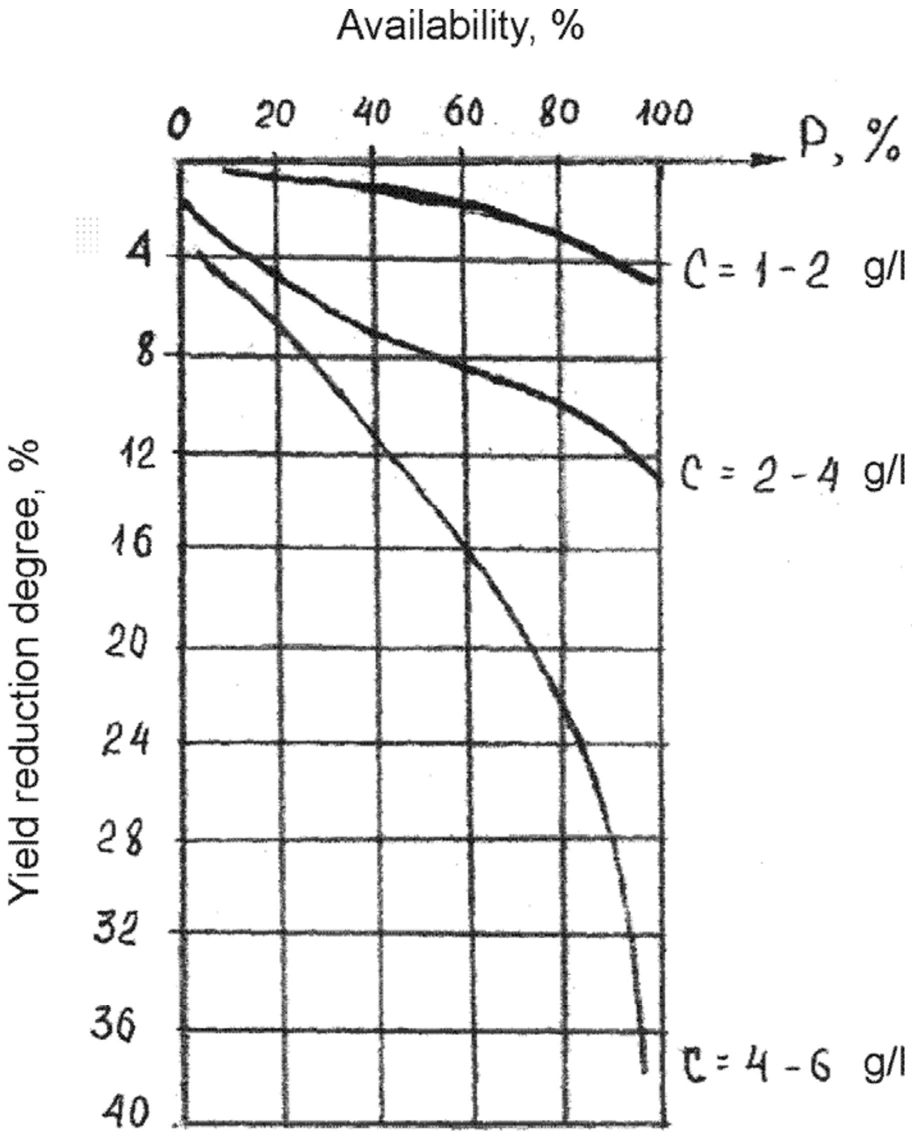
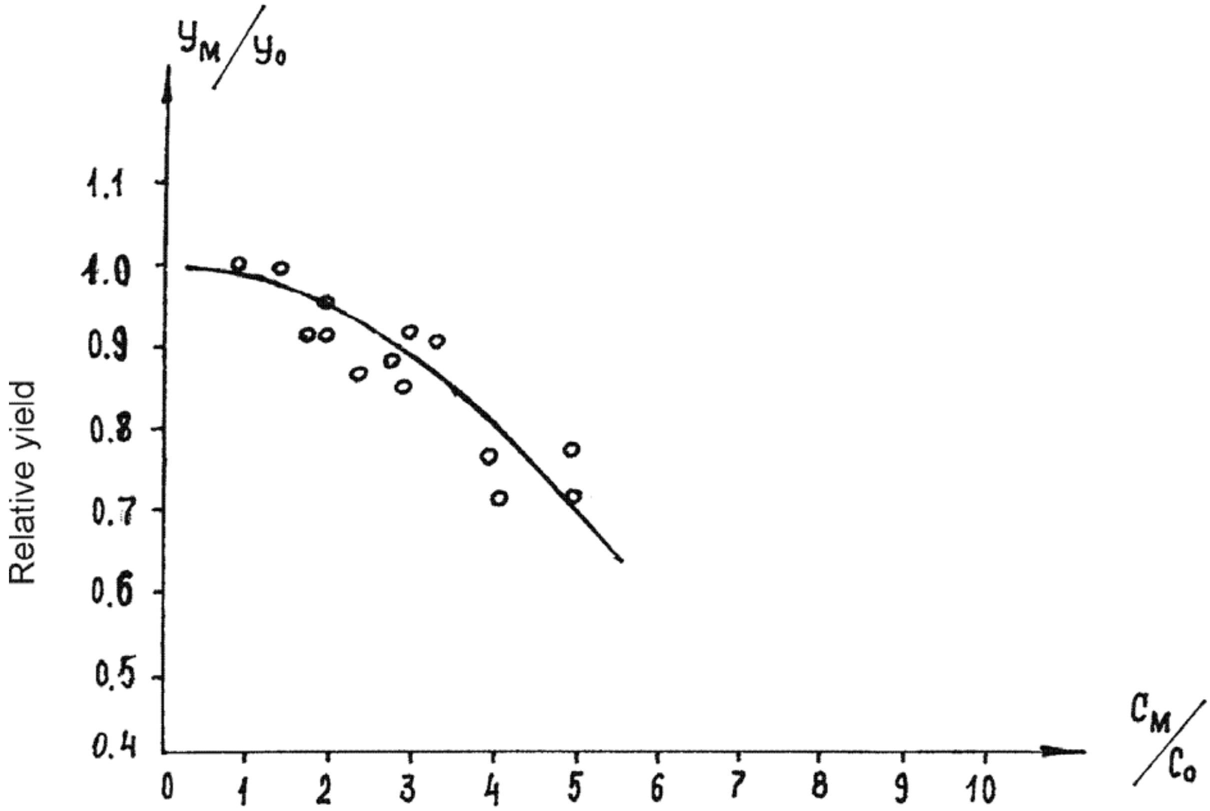
3.8. Measures on collector-drainage waters treatment and desalinization

For collector-drainage water safe use in places of its origin and river water quality increase, it is necessary to develop and introduce the methods for agricultural outflows treatment from pollutants. There is an experience on pesticides elimination with various macrophits, micro sea weeds and micro organisms, i.e. biological water treatment, on example of laboratorial and field investigations carried out in Shuruzak collector (Hungry Steppe), table 3.11.
Results show, that hyacinth and pistya aquatic plants significantly increase collector-drainage water quality, water salinity certain decrease occurred as well.



Dr. 3.6. Cotton yield relative reduction versus different used drainage water salinity.

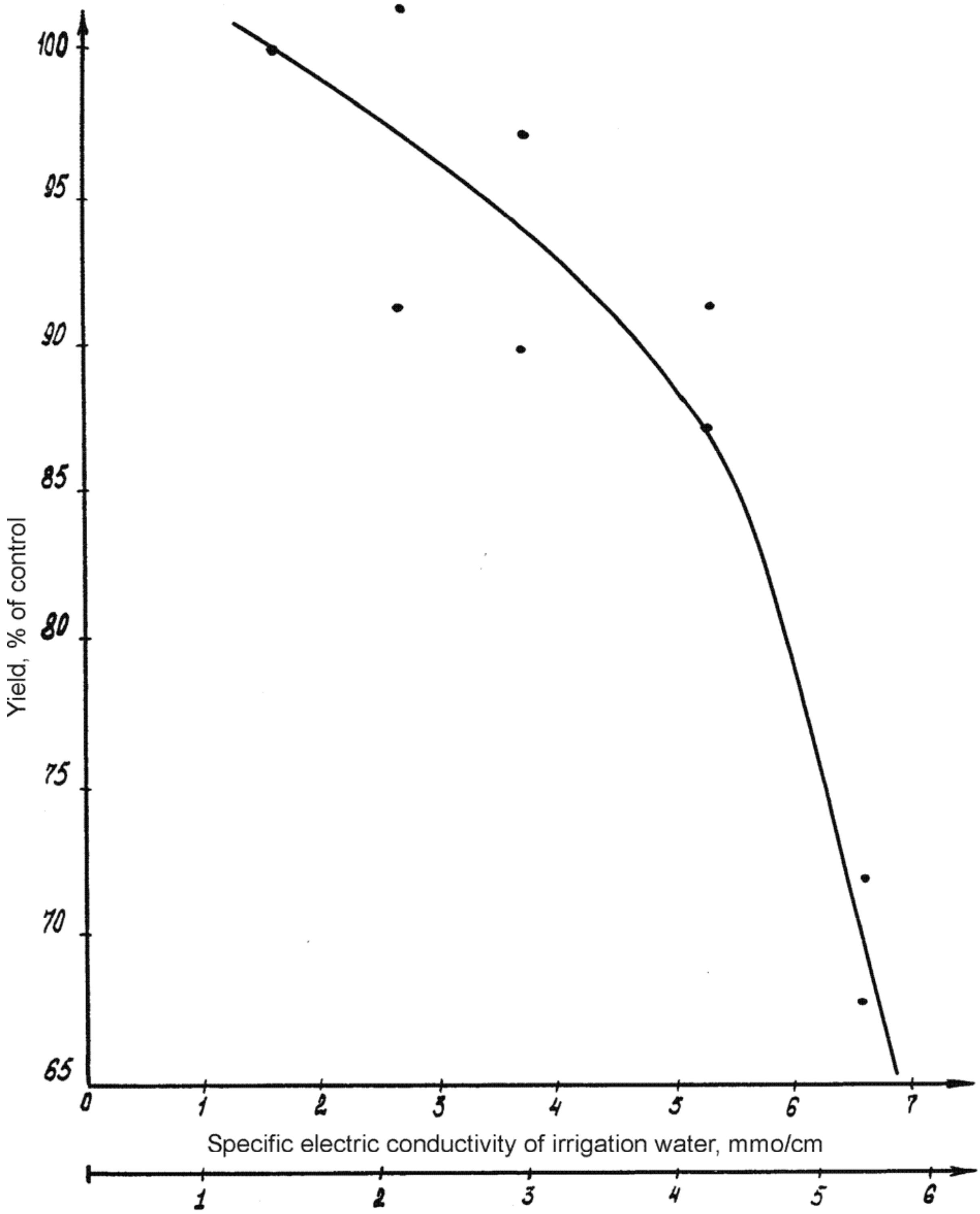


Dr. 3.7. Cotton yield versus used water salinity.

y_M - yield under irrigation by saline water

y_0 - yield under irrigation by ditch water (C_{op} up to 1,0 g/l)

C_M/C_0 - drainage water salinity versus ditch water salinity.



Dr. 3.8. Lucerne yield (hay and green mass) versus irrigation water salinity on pilot plots, % of control yield.

Table 3.11.

Shuruzak collector water chemical composition during investigations with hyacinth and pistya aquatic plants.

Name	PISTYA			HYACINTH		
	Start of experiment	after 2 days	after 14 days	Start of experiment	after 7 days	after 14 days
Total hardness	12,7	11,9	11,8	13,1	12,5	12,6
Calcium	110,23	86,2	84,1	90,1	88,2	71,4
Magnum	92,4	92,4	92,4	109,4	105,8	98,5
Chloride	207,79	193,2	160,4	198,0	190,1	166,3
Sulfate	691,3	687,2	681,4	701,2	697,2	676,5
Dry residue	1532	1480	1426	1504	1504	1460
Biogens:						
ammonia	0,19	0,11	0,08	0,77	0,19	0,088
nitrate	3,10	1,5	0,9	2,3	0,00	0,00
phosphate	0,577	0,228	0,064	0,15	0,068	0,068

Investigations data show, that while passing through overgrowth collector pesticides concentration in water decreased in the first transect from 0,4102 micro-gram/l to 0,043 micro-gram/l, in the second, respectively, from 0,808 micro-gram/l to 0,1292 micro-gram/l to 0,121 micro-gram/l, in the third 1,5 micro-gram/l. To the end of investigations, in month, pesticides concentration within the plants decreased over transects, respectively, up to 0,2 mg/kg and 0,07 mg/kg.

Consecutive collector-drainage water passing through filter consisting of various macrophites allowed to evaluate approximately selective ability of each macrophit for collector drainage water treatment from pesticides.

Table 3.12

Approximate assessment of selective efficiency of macrophites for collector drainage water treatment of GHZG

Macrophites species	GHZG quantity removed from collector drainage water, % to initial content	
	α - GHZG	γ - GHZG
Reed	80,2	80,2
Hyacinth + pistya + narrow- leave cattail	41,3	63,6
Sea weed + common cattail	47,4	62,7

In parallel with study of cleaning effect of macrophites, investigations of dynamics of collector drainage water hydrochemical indicators were carried out in experimental canal.
Investigations showed, that aquatic plants overgrowth emits a large quantity of oxygen due to biochemical processes leading to oxidation and destruction of chlorine-organic pesticides (table 3.13).

Table 3.13

Dynamic of hydrochemical indicators of pollution under collector water cleaning by aquatic plants in experimental canal.

Indicators	Transect 1 reed	Transect 2 pistya	Transect 3 narrow-leave cattail	Transect 4	Transect 5 the end of the canal (all plants species)
pH	7,8	7,9	7,9	7,8	7,9
t °C	26,0	26,4	25,8	26,0	25,9
electric conductivity, cm/m	1,5	1,6	1,5	1,5	1,5
turbidity, mg/l	10	0,4	0,3	0,3	0,2

Cleaned collector-drainage waters could be used for agricultural crops irrigation and for fishery, that allows river water quality to be significantly improved and reservoirs ecological and environmental safety to be increased.