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G. Zh. Medeuova

Kazakh National Women Teachers Training University, Almaty, Kazakhstan.
E-mail: medeuova.galiya96@gmail.com

RICE VARIETIES' AGROCOENOSIS FORMATION AND GRAIN CROPPING CAPACITY DEPENDING ON FERTILIZER QUANTITY

Abstract. Plant density in agrocenosis and the number of productive stems have significant effect on formation of a high grain yield of rice varieties and samples differing in height and architectonics. Thus, when an optimum fertilizer dosage (N180P120 kg/ha a.v.) is added, high grain yield is formed under the following conditions: 1) a high grain yield of a medium growth variety with narrow, vertically arranged leaves (Kuban 3, Krasnodar 424 and Dubovsky 129 varieties) is formed for the density of rice standing on the shoots of 320-400 pcs/m^2, before harvesting - 250-350 pcs/m^2, with a feed area of one plant of 22-30 cm^2, in the period of sweeping - 25-38 cm^2. In such an agrocenosis , the number of productive stems is 550-650 pcs/m^2, or 5.5-6.5 million panicles per hectare. 2) A high grain yield in medium-sized, large-leaved varieties (Marzhan, Aral 202, Togusken 1) is formed on highly productive crops, with a standing density of 280-350 pcs/m^2, before harvesting - 220-250 pcs/m^2, with 460-580 pcs./m^2 of productive stalks, or 4.6-5.8 million panicles per hectare. 3) In stunted, with large and wide leaves of varieties (Estuary) and rice samples (ECM), high grain yield is formed with a standing density of 280-380 pcs/m^2, before harvesting 220-310 pcs/m^2, with formations 550-650 pcs/m^2 of productive stems, or 5.5-6.5 million panicles.

Key words: rice, variety, effect of fertilizers on agrocenosis structure, rice varieties yield dependence on fertilizers' dosages.

In rice agrocenosis, formation of the number of productive stems changes during the growing season and, as an integral indicator, depends on many factors: the number and quality of sown seeds, the number of germinated seedlings, their rooting and preservation, tillering intensity, growth and productivity of side shoots. The number of these indicators, the intensity of growth and development of lateral shoots are significantly influenced by doses and methods of applying mineral fertilizers. The influence of the seeding rate and plant stand density in crops on the yield of rice grain has been studied in many studies and experimental results have been accumulated. In these works, the optimal plant stand density in crops is considered as one of the main factors that have a significant impact on the formation of high yields [1-3]. Currently, in Asian countries they intensify the technology of this valuable culture cultivation in order to provide their population with rice. Thus, according to scientists and specialists from China [4], Indonesia [5], Korea [6] and Vietnam [7], the highest and high-quality grains of rice are formed on crops with optimal plant density, balanced nutrients, and optimal doses and methods of mineral fertilizer application and with timely and high-quality carrying out of all agrotechnical techniques. The influence of the seeding rate and plant stand density on the yield of rice grain has been studied in many studies and experimental results have been accumulated. In these works, the optimum plant stand density is considered as one of the main factors that have a significant impact on the formation of high yields [1-3, 8].

Methods and objects of research. Small-plot and large-field field experiments were carried out on the saline soils of the Kazakhstan Aral Sea area in 2012-2017 to determine the favorable structure of agrocenosis of rice varieties and the optimum dosage of nitrogen fertilizer. Medium-height, narrow-leaved, early-ripe varieties such as Kuban 6 and Dubovsky 129, middle-ripe Krasnodar 424 variety, medium-tall, large-leaved samples 4-15, Kyzylorda 5, KzROS 356, Marzhan variety, low-growing, broad-leaved Firth were studied. In small-scale experiments, the seeding rate was 100, 300, 500, 700, 900 kg/m^2;

the dosage of fertilizers N90P90, N180P120 kg/ha a.v., were repeated three times. In large-scale experiments, the seeding rate for Kuban 3 and Liman varieties was 100 kg/ha (3 million viable seeds per hectare), 200 kg/ha (6 million), 250 kg/ha (7.5 million), 300 kg/ha (9.5 million viable seeds per hectare). Seeds of Marzhan variety are larger and spinous, therefore they sowed 130 kg/ha (3 million viable seeds), 230 kg/ha (6 million), 280 kg/ha (7.5 million) and 330 kg/ha (9.5 million viable seeds) using a seeder. Pilot crops were flooded on May 18-20. Mineral fertilizers (ammonium sulfate, granulated superphosphate) were added: N0P0, N90P90, N120P120, N150P120, N180P120, N240P120 kg/ha ae. The area of the plots was 150 m^2, the number of replications - four.

Results of research and discussion. *The main indicators of the structure of rice agrocenosis* include the optimum plant standing density, the number and productivity of main and lateral shoots and tillering intensity. These indicators vary significantly depending on the area of nutrition and doses and methods of mineral fertilizer application. Thus, in model experiments (plot area - 5 m^2), the greatest germination of seeds was observed when 100, 300 seeds were sawn per m^2. With an increase in the number of sown seeds (i.e. with a decrease in the area of nutrition), field germination of seeds decreased. For example, the germination of seeds of narrow-leaved rice varieties Kuban 3, Krasnodaprsky 424 and Dubovsky 129 decreased from 76.0-79.3% to 48.2-57.4%. The same patterns were observed with crops of large-leaved varieties Marzhan and samples 4-15, Kyzylorda 5, KSROC 356. However, with an increase in the seeding rate, more sprouting rice plants and the productive stems remained till harvesting (Fig. 1). Rice is an intensely bushy plant. With increase in area of nutrition and increase of fertilizers dosages, the number of the 2nd, 3rd and other side shoots increased significantly. However, with a decrease in the area of nutrition and the emergence of optimally dense shoots, tillering of rice decreases, shoots of the first and second order appear, which grow and develop synchronously, not lagging behind the main stem. This is one of the main conditions for obtaining high grain yields. But, with very thickened crops, the leaves located on the lower and middle levels are mutually strongly shadowed, tillering lingers, shoots appear without panicle, which leads to a decrease in grain yield [1-3].

When an optimum fertilizer dosage is added (N180/P120 kg/ha) and with highly productive agrocenosis (i.e. at the optimally crowded cultures) tillering increases and the number of productive stalks and side shoots (stalks with heads) (figure). Thus, when 300, 500, 700 pcs of germinating seeds per a m^2 and adding fertiliser at the rate of N180P120 kg/ha number of productive stalks of the pilot sowings of large-leaf varieties was 452-567, 469-613, 479-634 pcs/m^2, correspondingly. As for the narrow-leaf rice varieties with vertical leaf position, such as Kuban 3, Krasnodarskiy 424, the number of productive stalks was 487-686, 569-667 pcs/m^2, i.e. 8.8-21.0% more. At the optimum fertilizer dosage, such an increase in the number of productive stalks is the main condition of high grain yield formation (figure).

When an optimum fertilizer dosage is added to the rice varieties with narrow vertically arranged leaves such as Kuban 3 and Krasnodarskiy 424, the best yield was achieved when 500, 700 pcs/m^2 of germinating seeds had been sawed and at the density of plants growing of 320-430 pcs/m^2, prior to harvest – 250-280 pcs./m^2, at the area of one plant feed of 22-30 cm, during the period of ear formation – 25-38 cm^2, at the number of productive stalks of 550-650 pcs/m^2, i.e. when 5.5-6.5 mln. heads are formed per a hectare.

As regards the crops of large-leaved varieties and samples of rice, a high grain yield is formed when sowing 300, 500 pcs / m^2 of viable seeds and with formations of plant standing on shoots of 230-350 pcs/m^2, in the period of sprouting 220-300 pcs / m^2, with one feed area plants shoots 28-45 cm^2, in the period of sweeping - 31-50 cm^2. Under such conditions, the optimal number of productive stems was 460-580 pcs / m^2, i.e. 4.6-5.8 million ears of corn were formed on one hectare. Such crops are called by us highly productive agrocenosis [1-3].

Rice crops - dynamic agrocenosis. With the introduction of the optimal dose of fertilizers and depending on the density of standing and feeding area, the mutual influence of neighboring rice plants in crops during the growing season changes. These changes depend on the architectonics, morphophysiological and genetic characteristics of rice varieties. In rice crops, photosynthetic activity and plant growth processes have a significant impact on the level of yield and grain quality depending on standing density. In this regard, the rice crops are subdivided as follows: thinned, moderate, highly productive and highly thickened agrocenosis . The yield of such crops vary [1-3].

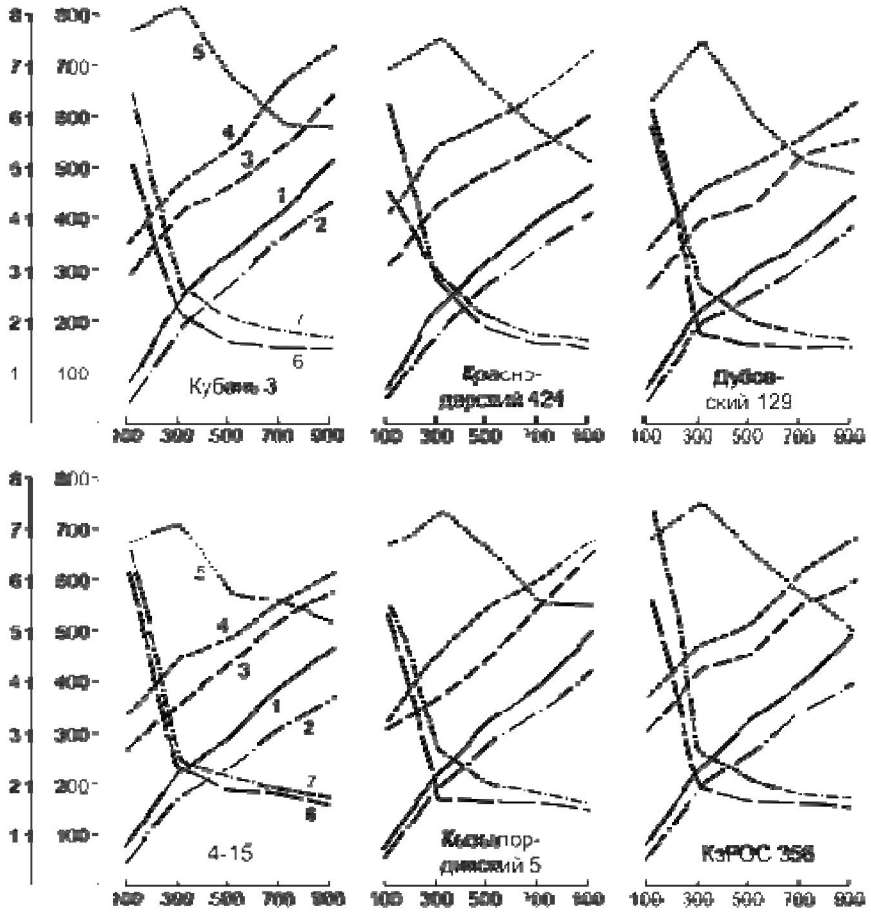

Figure 1 – Formation of agrocenosis structure of rice medium-growth varieties and samples differing by the architectonic depending on fertilisers' dosages and coverage area.

Conventional designation: 1 – number of springing rice sprouts, pcs./m^2; 2 – number of plants before harvesting, pcs./m^2; 3 – number of productive rice stalks at the fertilizer dosage of N90P90kg/ha; 4 – number of productive rice stalks at the dosage of N180P120 kg/ha; 5 – field germination rate %; 6 – rice tilling capacity at the fertilizer dosage of N90P90 kg/ha; 7 – rice tillering capacity at the fertilizer dosage of N180P120 kg/ha.

On all the different soils of the CIS territories, rice is responsive to the doses and methods of applying nitrogen fertilizers compared to phosphate fertilizers. However, with the joint application of nitrogen and phosphate fertilizers, rice forms the highest grain yield [1-3]. In this regard, the effect of nutrition area and doses of nitrogen-phosphate fertilizers on the formation of the structure and yield of agrocenosis of rice varieties (table) was studied.

Germinating ability of seeds and survival ability of sprouts. There is a positive correlative relationship between field seed germination, the number of preserved plants, the density of standing productive stalks and grain yield of rice crops [1-3]. Thus, when sowing 100, 300 seeds per a m^2 within the framework of the on model experiments (plot area 5 m^2), field seed germination was high. With an increase in the number of seeds sown (i.e. with a decrease in the nutrition area), field germination decreased. For example, field germination of seed varieties Kuban 3, Krasnodar 424, Marzhan decreased from 74-82% to 51.3-53.7%. Despite this, with an increase in the seeding rate, seedlings sprouted thick, the number of plants on crops increased and remained until harvest. Such patterns were preserved on experimental crops of dwarf and low-growing rice samples (figure; table). In model experiments, when sowing 100, 300, 500, 700 pcs / m^2 of viable seeds and when making optimal doses of fertilizers, the survival rate of the seedlings was high and more rice plants remained. But when sowing 900 pieces / m^2 of seed, the survival rate of seedlings decreased significantly. The results of the experiments show that with

Formation of rice density in agrocenosis and grain yield depending on increasing dosages of nitrogen fertilizers and seeding rate

Rice Variety	Seeding Rate, kg/ha	Number of Plants pcs/m^2		Field Germination Capacity, %	Sprouts Survival Rate, %	Number of Productive Stalks, pcs/m^2	Tilling Capacity, pcs/plant	Grain Yield, h.kg/ha
		Sprouts	Before Harvest					
1	2	3	4	5	6	7	8	9
N0P0, Control								
Kuban 3	100	144	110	48,0	76,4	186	1,69	33,4
	200	243	189	40,5	77,8	254	1,34	37,0
	250	300	240	40,0	80,0	301	1,25	38,1
	300	370	286	38,9	77,4	334	1,17	41,8
HCP_{05}	–	13,2	14,1	–	–	12,6	–	4,0
N120P120 kg/ha								
Kuban 3	100	151	116	50,3	76,8	480	4,22	42,2
	200	243	194	40,5	79,8	513	2,64	51,5
	250	314	247	41,9	78,7	531	2,15	58,1
	300	370	287	38,9	77,6	519	1,81	55,5
HCP_{05}	–	15,3	13,4	–	–	16,7	–	4,3
N150P120 kg/ha								
Kuban 3	100	143	109	47,7	76,2	508	4,66	50,6
	200	237	187	39,8	78,2	518	2,72	54,1
	250	305	243	40,5	79,7	553	2,28	67,7
	300	366	291	38,5	79,5	534	1,84	60,4
HCP_{05}	–	14,8	14,2	–	–	16,0	–	3,3
N180P120 kg/ha								
Kuban 3	100	148	112	49,3	75,7	549	4,90	60,8
	200	250	200	41,7	80,0	571	2,86	66,3
	250	319	253	42,7	79,3	591	2,34	78,0
	300	380	295	40,0	77,6	658	2,23	65,9
HCP_{05}	–	15,5	13,7	–	–	14,2	–	4,6
N240P120 kg/ha								
Kuban 3	100	146	116	48,7	79,5	581	5,01	66,2
	200	248	196	41,3	79,0	600	3,06	73,2
	250	315	245	42,0	77,8	631	2,58	74,0
	300	376	298	39,6	79,3	672	2,26	58,8
HCP_{05}	–	13,5	12,8	–	–	13,8	–	4,5
N0P0, control								
Mar-zhan	130	124	95	41,3	76,6	176	1,85	35,3
	230	224	175	37,3	78,1	235	1,34	38,7
	280	278	219	38,1	78,8	278	1,27	41,3
	330	336	273	35,4	82,3	273	1,16	42,4
HCP_{05}	–	12,1	13,4	–	–	10,8	–	4,3
N120P120 kg/ha								
Mar-zhan	130	123	102	41,2	82,8	505	4,95	44,8
	230	227	175	37,8	77,1	512	2,93	53,4
	280	296	227	39,5	76,7	535	2,36	61,5
	330	345	268	36,3	77,7	518	1,93	51,2
HCP_{05}	–	12,3	10,3	–	–	12,0	–	4,6

Continuation of table

1	2	3	4	5	6	7	8	9
N150P120 kg/ha								
Mar-zhan	130	119	103	39,7	86,6	516	5,01	51,5
	230	228	179	38,0	78,5	528	2,95	57,4
	280	293	231	39,1	78,8	549	2,38	70,2
	330	349	276	36,7	79,1	569	2,05	57,8
HCP_{05}	–	13,7	12,0	–	–	14,0	–	4,4
N180P120 kg/ha								
Mar-zhan	130	125	98	41,7	78,4	522	5,33	59,0
	230	233	173	38,8	74,2	541	3,13	66,8
	280	297	229	39,6	77,1	551	2,41	73,8
	330	357	282	37,6	79,0	591	2,10	61,5
HCP_{05}	–	14,1	12,7	–	–	13,5	–	4,5
N240P120 kg/ha								
Mar-zhan	130	121	97	40,7	80,2	539	5,56	60,1
	230	229	171	38,2	74,7	557	3,26	66,7
	280	291	225	38,8	77,3	594	2,64	65,5
	330	361	289	38,0	80,1	624	2,16	53,0
HCP_{05}	–	5,3	5,5	–	–	6,4	–	3,8
N0P0, Control								
Liman	100	121	94	40,3	77,3	163	1,73	28,8
	200	222	163	37,0	73,4	228	1,40	32,7
	250	269	210	35,9	78,1	263	1,25	35,0
	300	335	252	35,3	75,2	314	1,25	38,4
HCP_{05}	–	12,5	12,8	–	–	11,4	–	4,6
N120P120 kg/ha								
Liman	100	119	100	39,7	84,0	490	4,90	42,4
	200	219	167	36,5	76,3	514	3,08	57,5
	250	284	217	37,9	76,4	530	2,44	64,2
	300	341	257	35,9	75,4	518	2,02	57,4
HCP	–	14,2	13,1	–	–	12,3	–	5,0
N150P120 kg/ha								
Liman	100	124	96	41,3	77,4	515	5,36	51,9
	200	224	174	37,3	77,7	558	3,21	65,0
	250	287	232	38,3	80,8	601	2,60	71,6
	300	347	265	36,5	76,4	540	2,04	61,9
HCP_{05}	–	14,4	15,2	–	–	13,7	–	4,1
N180P120 kg/ha								
Liman	100	123	95	41,2	77,4	553	5,76	57,0
	200	228	167	38,0	73,2	571	3,42	66,5
	250	286	228	38,1	79,7	641	2,81	69,2
	300	352	273	37,1	77,6	675	2,47	57,1
HCP_{05}	–	15,5	14,3	–	–	13,1	–	4,8
N240P120 kg/ha								
Liman	100	123	98	41,0	79,7	581	5,93	52,7
	200	227	160	37,8	70,5	600	3,75	58,5
	250	285	227	38,0	79,6	659	2,90	58,2
	300	345	275	36,4	79,5	691	2,51	53,2
HCP_{05}	–	13,4	12,3	–	–	15,0	–	3,7

the introduction of the optimal dose of fertilizers (N180P120 kg / ha ai) and with the optimum density of germinated seedlings, the penetration of light, carbon dioxide (CO2) and the temperature inside the agrocenosis improved and good conditions were established for the growth and development of each rice plant in agrocenosis.

Rice tillering depends on the area of nutrition [1-3], the dose, timing and methods of applying mineral fertilizers [1-3, 9, 10, 16], the depth of water within the check plots and changes in irrigation mode [9, 10, 12, 13, 15]. The results of our research showed that with an increase in the seeding rate (i.e., a decrease in the nutritional area) and an increase in plant density to the optimum level, tillering of rice stops. With the introduction of an average dose (N120P90-120 kg / ha), tillering of rice increases as compared with plants on the control (without fertilizer) and the introduction of small doses (N90P90 kg / ha AI) of fertilizers. With an increase in the dose of fertilizer to the optimum (N180P120 kg / ha) and sowing of 500, 700, 900 pcs / m^2, the level of tillering of rice decreased. In spite of this, with increasing doses of fertilizers, the number of productive stems increased. On crops of medium-grade rice varieties, with the introduction of optimal (N180P120 kg / ha) and high (N240P180 kg / ha AV) fertilizer dose, bushiness when sown 100 pcs / m^2 from 7.7-9.1 pcs / m^2 decreased to 1, 8-1.9 pcs / m^2, i.e. 4.1-4.7 times when sown 900 pieces / m2 of germinating seeds. The same patterns were observed on dwarf and low-growing varieties. However, with increasing doses of fertilizers, bushiness and the number of productive rice stalks increased to a certain extent (figure). Consequently, on high agro-backgrounds, a decrease in nutritional area (i.e., an increase in plant standing density) is a factor that reduces rice bushiness.

The productivity of lateral shoots from the different rows is not the same. As the place of emergence of lateral shoots in the tillering node increases, the stem height, the length of the panicle and the number of grains on the panicle of side shoots decrease. Side shoots that appear on the lower level of the tillering node, i.e. 3-5 leaves on the bosom grows and develops synchronously, not lagging behind the main stem and is the most productive. However, depending on the density of the standing of rice plants and the area of nutrition, doses and methods of fertilizer application, the optimal number of side shoots differ [1-3, 8, 9].

In this regard, the agrocenosis of rice varieties have been systematized as follows [1-3, 10]: *thinned out plantings* (sowing of 100 of viable seeds per a m^2), *moderate plantings* (sowing of 300 vaible seed per a m^2), *highly productive crops* (sowing 500, 700 seeds per a m^2) and *thickened crops* (sowing 900 germinated seeds per a m^2). When adding an optimum dosage of fertilizers (N180P120 kg/ha), the largest grain yield of medium-sized rice varieties is formed in the following agrocenosis:

a) *Thinned out crops* of medium-ripening rice varieties with appearances of 6-8 lateral shoots on each rice plant; *moderate crops* with formations of 2.5-4.0 lateral shoots; *highly productive crops* - 1.8-2.5 lateral shoots; *thickened crops* with appearances of 1.1-1.6 lateral shoots on each plant;

b) for undersized samples and rice varieties, thinned out crops form the largest grain yield when there are 9-10 lateral shoots on each plant; *moderate crops* - 3.5-5.0 lateral shoots, on highly productive agrocenosis - 2-3 side shoots; *thickened crops* - with the appearance of 1.6-2.0 side shoots on each plant;

c) As for the dwarf speciment, thinned out crops produce the largest grain yield when 9-11 side shoots appear on each plant; moderate crops - 5-6 side shoots; highly productive crops - 3-4 side shoots; thickened crops - 2.1-2.5 side shoots on each rice plants.

Improving the rice varieties agrocenosis structure is important and relevant for the intensive development of rice farming [1-3]. However, the density of plant standing, formation of optimal stalk stand and its location in space, formation of plant habitus in agrocenosis and its interaction in the physiological aspect have not been sufficiently studied.

The formation of the optimal number of productive stalks in agrocenosis depends on the number of seedlings germinated and their field germination, seedling survival rate and their standing density, dose and methods of mineral fertilizers application and varietal characteristics of rice (figure; table). Thus, in medium-sized varieties and samples, the largest grain yield is formed on highly productive crops (when sowing is 500,700 viable seeds) and application N180P120 kg / ha ae. fertilizer. With an increase in the dose of fertilizer up to N240P180 kg / ha ae. grain yield has not increased, but rather decreased.

In low-growing varieties and samples of rice, the level of yield varies: in a broad-leaved variety (Lyman), the highest grain yield is formed when the optium dosage (N180P120 kg/ha) of fertilizers is applied. On highly productive agrocenosis in varieties and samples of rice, photosynthetic activity and the

possibility of the formation of high grain yields differ. The formation of a high grain yield in varieties and samples of rice, differing in height and architectonics, is significantly affected by plant density in agrocenosis and the number of productive stems. Thus, with the introduction of the optimal dose (N180P120 kg / ha ai) of fertilizers, a high grain yield is formed under the following conditions [1-3, 11, 14, 17]:

1) A heavy yield of grain of medium-growth varieties with narrow vertically arranged leaves (Kuban 3, Krasnodar 424, Dubovsky 129) is formed in highly productive crops, with a density of rice standing on shoots of 320-400 pcs/m^2, before harvesting - 250-350 pcs/m^2, with a food area of one plant 22-30 cm^2, in the period of sweeping out - 25-38 cm^2. In such agrocenosis , the number of productive stems is 550-650 pcs / m2, or 5.5-6.5 million panicles per hectare.

2) A high grain yield in medium-sized, large-leaved varieties (Marzhan, Aral 202, Togusken 1) is formed on highly productive crops, with a density of standing of 280-350 pcs / m2, before harvesting 220-250 pcs/m^2, with 460-580 pcs./m^2 of productive stalks, or 4.6-5.8 million panicles per hectare.

3) Heavy yield of low verieties with large and wide leaves (Estuary) and rice samples (ECM)is ensured at a standing density of 280-380 pcs/m^2, before harvesting 220-310 pcs/m^2, with formations 550-650 pcs/m^2 of productive stems, or 5.5-6.5 million panicles. We called the above-mentioned crops of rice varieties, differing in height and architecture, as **high-yielding agrocenosis** [1-3, 11]. Those crops of low- and medium-growth varieties and rice samples are **representative** of specific agrocenosis . Indicators of these agrocenosis can be preliminary morphophysiological criteria (indicators) when creating models of future productive rice varieties and this should be taken into account when developing varietal technologies for their cultivation [1-3, 11].

Ғ. Ж. Медеуова

Қазақ мемлекеттік қыздар педагогикалық университеті, Алматы, Қазақстан

ТЫҢАЙТҚЫШТАР ДОЗАСЫНА БАЙЛАНЫСТЫ КҮРІШ СОРТТАРЫ АГРОЦЕНОЗЫНЫҢ ЖӘНЕ ДӘН ӨНІМІНІҢ ҚАЛЫПТАСУЫ

Аннотация. Биіктігі және архитектоникасы бойынша айырмашылығы бар күріш үлгілері мен сорттарының жоғары дән өнімінің қалыптасуына агроценоздағы өсімдіктер тығыздылығы мен егістіктегі масақты сабақтар санының елеулі әсері бар. Атап айтқанда, оптимальды агрофон (N180P120 кг/га) жағдайында ең жоғары дән өнімі төмендегі жағдайларда қалыптасады: 1) Орта бойлы, жіңішке, тік жапырақты күріш сорттарының (Кубань 3, Краснодарский 424, Дубовский 129) ең жоғары дән өнімі себілген тұқымнан өніп шыққан өсімдіктер саны 320-400 дана/$м^2$, ору алдында 250-350 дана/$м^2$ болып, тұқымнан әдепкі өніп шыққан өскіндердің қоректену алаңы 22-30 $см^2$, масақтану кезінде 25-38 $см^2$ болғанда қалыптасады. Мұндай агроценоздағы өнімді (масақты) сабақтардың саны 550-650 дана/$м^2$, немесе гектарына 5,5-6,5 млн. масақ. 2) Орта бойлы, ірі жапырақты күріш үлгілері (4-15, КзРОС 356, Кызылординский 5) мен сорттарының (Маржан, Арал 202, Түгіскен 1) ең жоғары дән өнімі егістіктегі өсімдіктер тығыздылығы өніп шыққан кезде 280- 350 дана/$м^2$, ору алдында- 220-250 дана/$м^2$, өнімді сабақтар саны 460-580 дана/$м^2$, немесе гектарына 4,6-5,8 млн. масақты сабақтар болғанда қалыптасады. 3) Аласа бойлы, ірі жапырақты сортының (Лиман) жоғары дән өнімі егістіктегі өсімдіктер тығыздылығы өніп шыққан кезде 280-380 дана/$м^2$, ору алдында 220-310 дана/$м^2$, өнімді сабақтар саны 550-650 дана/$м^2$, немесе гектарына 5,5-6,5 млн. масақты сабақтар болғанда қалыптасады.

Түйін сөздер; күріш, сорт, агроценоз құрылымына тыңайтқыштар әсері, Тыңайт-қыштар дозасына байланысты күріш сорттары дән өнімінің құралуы.

Г. Ж. Медеуова

Казахский государственный женский педагогический университет, Алматы, Казахстан

ФОРМИРОВАНИЕ АГРОЦЕНОЗОВ СОРТОВ РИСА И УРОЖАЙНОСТЬ ЗЕРНА В ЗАВИСИМОСТИ ОТ ДОЗЫ УДОБРЕНИЯ

Аннотация. На формирование высокого урожая зерна у сортов и образцов риса, различающиеся по высоте и архитектонике, оказывают существенное влияние густота стояния растений в агроценозах, количество продуктивных стеблей. Так, при внесении оптимальной дозы (N180P120 кг/га д.в.) удобрений высокий урожай зерна формируется в следующих условиях: 1) Высокий урожай зерна среднерослых, с узким, вертикальным расположением листьев (Кубань 3, Краснодарский 424, Дубовский 129) образуется на высокопродук-

тивных посевах, при густоте стояния риса по всходам 320-400 шт/м^2, перед уборкой -250-350 шт/м^2, при площади питания одного растения 22-30 см^2, в период выметывания – 25-38 см^2. В таких агроценозах количество продуктивных стеблей равен 550-650 шт/м^2, или на гектаре 5,5-6,5 млн. метелок. 2) Высокий урожай зерна у среднерослых, крупнолистных сортов (Маржан, Арал 202, Тогускен 1) формируется на высокопродуктивных посевах, при густоте стояния 280-350 шт/м^2, перед уборкой – 220-250 шт/м^2, при количестве 460-580 шт/м^2 продуктивных стеблей, или 4,6-5,8 млн. метелок на гектаре. 3) У низкорослых, с крупными и широкими листьями сортов (Лиман) и образцов риса (ECM) высокий урожай зерна формируется при густоте стояния 280-380 шт/м^2, перед уборкой – 220-310 шт/м^2, при образований 550-650 шт/м^2 продуктивных стеблей, или 5,5-6,5 млн. метелок.

Ключевые слова: рис, сорта, влияние удобрений на структуру агроценоза, формирование урожая сортов риса в зависимости от доз удобрений.

Information about author:

Medeuova Galiya Jumakanovna, Cand. Sc. (Agriculture), Acting Professor, Kazakh National Women Teachers Training University, Almaty, Kazakhstan; medeuova.galiya96@gmail.com; https://orcid.org/ 0000-0003-3750-4758

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