

асады. Қазіргі уақытта стронций және цезийдің ластануынан өткір токсинді факторлардың пайда болу нәтижесінде радиоактивті заттармен ластану назары жоғарылауда.

Кілт сөздер: радионуклидтер жинақтау, қайың, топырақ, өсімдік.

Bektemirov A., Kentbayev E., Asemkulov T.

INFLUENCE OF CONSEQUENCES OF NUCLEAR TESTS ON A FLORA AND FAUNA OF THE BAND CONIFEROUS FORESTS REPUBLICAN PUBLIC INSTITUTION SFNR «SEMEY ORMANY»

Pollution of system "the soil – plants – water" various chemicals and mainly firm, liquid and gaseous expenditure of the industry, fuel products, etc. leads to change of a chemical composition of soils. Technogenic emission of radionuclides in environment in many areas of the globe considerably exceeds natural norms. Until recently, as the main substances of pollution, mainly, clean, dark gray and carbonaceous gases, oxides of sulfur and nitrogen, hydrocarbons considered. Radionuclides considered to smaller degree. Now interest in pollution by radioactive materials grew, in connection with factors of emergence of the sharp toxic effects caused by pollution by strontium and cesium.

Keywords: radionuclides accumulation, birch, soil, vegetation.

UDK 635.64:631.544.42

Belgitaeva I.Sh., Kampitova G.A.

Kazakh national agrarian university

THE EFFECT OF SUPPLEMENTARY LIGHTING ON TOMATO PRODUCTIVITY IN GREENHOUSE

Annotation

In the article considering the effect from artificial light on tomato productivity in greenhouse, in Almaty region

Key words: tomatoes, lighting lamps, hybrids, protected crop, yield, costs, potential of the Kazakhstan market.

Tomato is a valuable vegetable; the average annual consumption is actually 3.9 kg/y per person according to the Ministry of Agriculture of the Republic of Kazakhstan as per 2013[1]. WHO says the rate of tomato consumption is 28-35 kg per person annually. Pursuant to the Institute for Innovation data as per 2010, China is the world leader in the tomato production - 33.9 million tons, 850 thousand hectares, the USA - 13.7 million tons, Turkey - 11 million tons, India - 20.3 million tons. All Europe products are 23.2 million tons, Europe leads in the consumption of tomato - 19 kg/person annually. Today about 1.6 million hectares are occupied with tomatoes in the world's protected ground[2].

Kazakhstan has a huge potential for the production of vegetables: land, water, energy, cheap labour, stable domestic market, consumption and the export ability and significant government support.

The leading countries producing fruits and vegetables for instance Holland has the harvest of 65-70 kg per square meters tomatoes, and Finland up to 180 kg of cucumbers per square meter using a double supplementary lighting.

Now Kazakhstan greenhouse business has been very rapidly developing. Over one hundred hectares with modern greenhouses were built recently in Kazakhstan where vegetables including tomato are cultivated using the supplementary lighting.

In the winter greenhouses of Almaty region, tomato is mainly cultivated in the winter-spring and summer-autumn turnover, products come from March to November, so there is a shortage in the winter months. This fact evidences we need to use the artificial lighting. One of the ways enabling to reduce the shortage of fresh vegetables in the off-season and increase production efficiency is the use of transition turnover with additional supplementary lighting for plants during the tomato cultivation period in Kazakhstan.

Materials and methods:

Since greenhouses built in 1996 and 2013 are quite different in their design and the technology used, the research were done in modern greenhouses built in 2013, in Almaty region, Arna village. If prior to 1996, we used greenhouses of block type, with 4.3 meter in ridge height, but now greenhouse business is constantly being improved and currently greenhouses are constructed higher and higher. At the present cultivation innovative technology using small-volume hydroponics replaces ground greenhouses and enables to eliminate the contamination by pests and diseases from the soil.

The glass greenhouse equipped with sodium lamps made by the Dutch company Hortilux[3], which are specially designed for the proper growth and development of plants, increases the light for plants for 10%, compared to competitors; provides acceleration of growth, improvement of product quality, reduction in energy costs per unit of output and higher profitability. The company has used the latest technology in the design of these lamps, i.e. unique lamp cooling fins ensure optimum temperature regulation. Therefore, HSE NXT II is the coolest lamp. Performance of these lamps is 18-20 thousand Lux, the exposure of plants extends from 12 to 16 hours.

According to PAR(photosynthetic active radiation) Almaty region is in the 7th light zone. Unlike the human eye, the susceptibility of plants to light covers a much wider part of the spectrum. Photosynthesis in plants is a complex process which converts water and carbon dioxide into starch and oxygen through the light. In other words, the light energy is converted into chemical energy; this process occurs in all green plants.

The objects of study are hybrids of Dutch and Russian breeding: Tomimara Mucho, Torero, Merlis, Rolex. Experience is founded under small-volume technology associated with the mineral wool. We used 70 joule/sq.m/h light intensity. Control has been set with 40 joule/sq.m/h level of supplementary lighting, while the normal development of tomato requires 1800 joule/sq.m.[4]

Tomimaru Mucho F1 is indeterminate hybrid of large tomato with pink fruits intended for cultivation in glass greenhouses. It has mostly generative type, robust stem, the average force of growth. It is early ageing. Hybrid demonstrates the high productivity during all seasons: in the early spring, summer and winter. Tomimaru Mucho F1 is a leader among pink tomatoes in Japan, and it is popular in Europe because of the wonderful taste.

Torero F1 (Torero F1), which is macrocarpous, high-yielding (65 kg/m²) beef-tomato, is recommended for cultivation in all turnovers and for gathering as individual fruits. The plant is tall, balanced, generative, of open type with the average strength of growth, easy to use. It is great for photo - culture. This plant has a resistance to Torrado virus.

Merlic F1 (Merlic F1) is a macrocarpous grapevine tomato with early ageing, and highly productive hybrid. Indeterminate tomato is perfect for photoculture in order to cultivate plant on mineral substrates in the extended turnover. This plant has early ageing. It is medium, with a moderate strength for growth, balanced, moderately generative plant, resistant to the powdery mildew.

Rolex F1 Rolex has average period of ripening, the period from germination to fruit ripening is 110-115 days in seeding culture. The plant is of indeterminate type, leafy is average. Hybrid is characterized by good fruit inception in a cluster, productivity, large-fruited, high quality and uniformity of fruits.

The major supplier of vitamin vegetables in the winter is protected ground. Modern volume of cultivated vegetable production does not meet the population growing needs. The intensity of solar radiation in the winter does not exceed 300-400 joule/ cm.sq. since a significant amount of

sunlight is reflected and absorbed by the roof of greenhouse. Due to contamination of glass with industrial dust, 50% at most of the incoming natural light penetrates through such the glass.

Insufficient lighting for vegetable crops leads to a significant reduction in yields. Therefore, cultivation of tomatoes in protected ground is only possible using the additional supplementary lighting in the autumn and winter months.

Investigation results and discussion

Photoculture of plants consists of the following factors: the spectrum of light, the amount of light, time interval, frequency of exposure, thermal regime. During the year, these factors combine quite rarely, only in the summer. Otherwise, we would receive a lot of fruitage. But in the winter period such the conditions are available in greenhouse only; tomatoes may be cultivated in photoculture only. In low-light conditions according to experiments of 2013, tomato hybrids did not create inflorescences; vegetative mass of plants was only developed. With deteriorating the light conditions the formation of inflorescences reduced, which confirms the statements of many researchers such as V.S. Mashkov (1966)[5], V.M. Lehman (1972)[6], S.A. Rakutko, V.N. Sudachenko, A.E. Markova (2012)[7], who argue that the weakening of light intensity during this period, as a rule, leads to disruption of the reproductive processes. In 2013 the same varieties of indeterminate hybrids showed especially strong reaction where fruit inception (inflorescence) is directly proportional to lower lightning.

The main limiting factor in getting the harvest in protected ground is often the lightning. Many physiological disorders, leading to decrease in plant productivity and deterioration of vegetables quality are associated with a deficit of light. The lack of light affects various life processes of plants, since the most physiological and biological reactions in the plant body are due to the absorption of light energy. Photosynthetic activity of the leaves is firstly suppressed. In this regard, determination of the influence of planting dates and transplanting into the substrate at different degrees of lightning on fruiting is an important issue in the development of the technology of tomato cultivation in winter greenhouses.

The seeding was sown into stone wool plugs on the 23rd of July, good and even sprouts were observed on the following 4th day. Then the plugs were transferred into 150x100 mm stone wool cubes with two holes. On the 23rd of August seedlings were transplanted into the stone wool substrate. On the 53-55th day after sowing we watched the beginning of truss initiation. The air temperature was maintained at 22-24 °C with a ventilation and high pressure fog in the greenhouse.

Tomatoes observed in these experiments were planted in the same square, in triplicate, and two options. In the first option (CONTROL), we switched on only 60% of the lamps to achieve 400 joules supplementary lighting intensity. The lighting was investigated in Almaty region (Figure), according to the climate computer data installed on the roof of greenhouse, and then the sum of two options was calculated in joules per square meter. Next we examined the impact of two supplementary lighting options (Table), area of leaf surface in the first option is better developed than in the second test option, but the yield is much lower, moreover, we did not have the yield in the control option at the beginning of the plant supplementary lighting starting from November, we observed only the green fruits, which will surely affect the overall productivity and cost per unit of output.

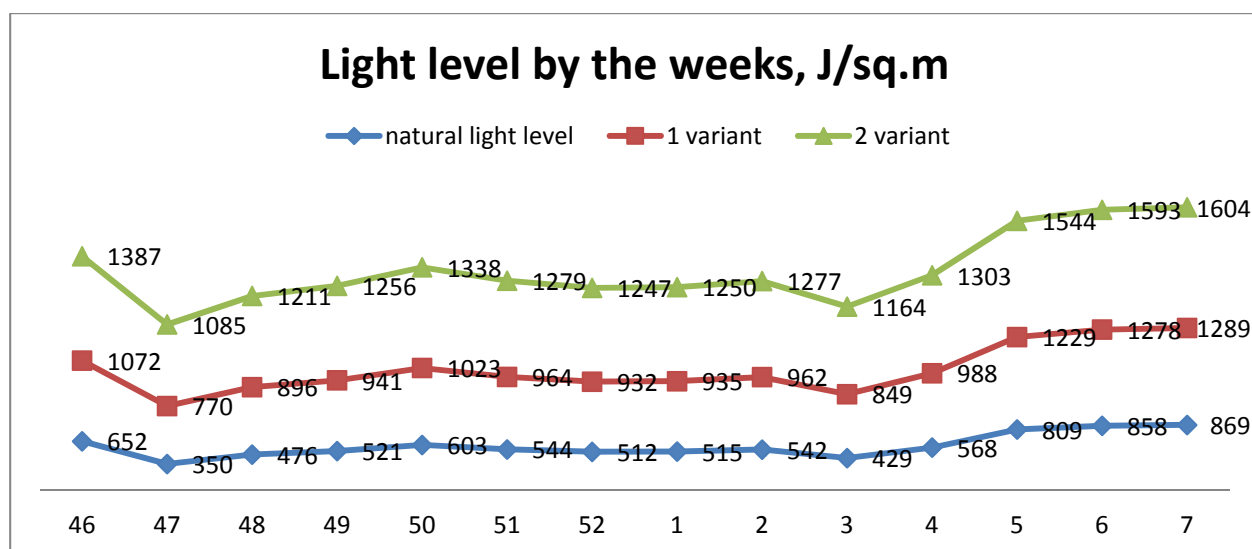


Figure-Light level from November to February (natural), total by 2 options.

Table-Influence of lightning on phenology marks and productivity on tomato on 2 options.

VARIETY/ MARKS		Tomimara Mucho		Torero		Merlic		Rolex	
		Opt.1(c ontrol) 40j/ sq.m	Opt.2- 70J/sq. .m	Opt.1 (cont rol)4 0j/sq. m	Opt.2- 70J/sq. m	Opt.1(c ontrol) 40j/sq. m	Opt.2- 70J/sq. m	Opt.1(c ontrol) 40j/sq. m	Opt.2- 70J/sq.m
Index of leaf area		115,75	64,46	81,19	75,1	93,74	79,1	90,36	83,26
Leaves quantity		17	16	19	14	19	14	12	10
Stem length		6,7M	6,3M	6,9M	6,8M	6,6M	6,4M	2,5M	2,7M
Truss quantity		6	8	7	9	5	8	5	5
Lightning /hours per day		10,5ч	10,5ч	10,5ч	10,5ч	10,5ч	10,5ч	10,5ч	10,5ч
Extra light, joules		420	735	420	735	420	735	420	735
Productivity, kg/sq.m	November	-	3,2	-	1,1	-	1	0,7	1,1
	December	4,6	5,28	2,9	8,4	2,4	5,9	1,9	3,2
	January	5,26	5,5	6,3	5,9	3,1	5,3	1,03	1,47

Conclusions

Now according to observations we can conclude that the use of supplementary lighting strengthens the plants much more, as shown by the stem diameter, leaf area, size and weight of the fruit that are larger for 40% or more compared to supplementary lighting period.

The productivity of tomato is greatly influenced by the level of supplementary lighting, since 70 joules supplementary lighting increases the tomato yield in comparison with the control option with 40 joules supplementary lighting. (Table).

Literature

1. Report from Ministry of agriculture by the form 29-AC, Press-centre of ACM KR, 2014th year.
2. www.hortidaily.com
3. www.hortilux.nl
4. Supplemented lightning as of today // World of greenhouses .- 2009.-No. 6.- p. 26-28.
5. *Mashkov B.S.* Cultivation of plants using the artificial lighting. - Moscow: Kolos, 1966.- 287 p.
6. *Lehman V.M.* Course of plants' supplemented lightning. 2nd Ed. - M.: Higher sch. - 1976. - 272 p.
7. *Rakutko S.A., Sudachenko V.N., Markova A.E.* Evaluating the effectiveness of optical radiation for photo culture under the largest energy intensity // Fruit and berry – growing // Russia.- 2012.- No. 33.-p. 270-278.

Белгитаева И.Ш., Кампитова Г.А.

ВЛИЯНИЕ КОМБИНИРОВАННОГО ОСВЕЩЕНИЯ НА ПРОДУКТИВНОСТЬ КУЛЬТУРЫ ТОМАТА В ТЕПЛИЦЕ

В статье рассматривается влияние дополнительного досвечивания на урожайность культуры томата в теплице в Алматинской области, в переходном обороте.

Ключевые слова: томаты, лампы досвечивания, защищенный грунт, гибриды, урожайность, себестоимость, потенциал рынка Казахстана.

Белгитаева И.Ш., Кампитова Г.А.

ҚОСЫМША ЖАРЫҚТЫҢ ҚЫЗЫНАҚТЫҢ ЖЫЛЫ ЖАЙДАҒЫ ӨНІМДІЛІГІНЕ ӘСЕРІ

Мақалада Алматы облысындағы жылы жайда қызынақ өнімділігіне қосымша жарық пайдаланудың өтпелі ауысымда тигізетін ықпалы қарастырылған.

Кілт сөздер: қызынақ, қосымша жарық шамдары, қорғаулы топырақ, будандар, өнімділік, өзіндік құны, Қазақстанның нарық әулеті.

ӘОЖ: 528.94:332.6

Берікбаев А.А.

Қазақ ұлттық аграрлық университеті

ГЕОАҚПАРАТТЫҚ ЖҮЙЕЛЕР ЖӘНЕ ОЛАРДЫ КӘСІПОРЫНДАРҒА ЖЕР БӨЛІП БЕРУДЕ ПАЙДАЛАНУ

Аңдатпа

Мақалада геоақпараттық жүйелерді (ГАЗ) жерге орналастыруда пайдаланудың қазіргі жағдайы және оларды кәсіпорындарға жер бөліп беруде пайдалану мүмкіндіктері жайлы зерттеулерді талдау нәтижелері баяндалады

Кілт сөздер: геоақпараттық жүйелер, жерге орналастыру, жер кадастры, ауыл шаруашылығы, өнеркәсіп, кәсіпорын.