A conic spindle and an extractor disk are source components of the cotton collecting machine. Increasing their reparability can be considered as one of serious, scientific technological problems.

The conical spindle and disk extractor are one of the main structural parts of the harvesting machine. Enhancement their reparability can be considered as an actual problem.

Three year results of examinations of "Case-2022" HSM which were done at the "Testing and certification center of irrigation technologies and technics of Uzbekistan" showed that mostly problems are related to conic spindle cane and trapezoid teeth of the extractor drum disks. With regard to these, 66.2 % and 17.4 % of common problems are related to above mentioned breakings.

Extractors and spindles are not repairable. Because the bevel gear which is base of the spindle shaft and the lower teeth and both rods are one solid metal; the extractor disk and trapezium teeth are made of the same elastic metal and modeled in alloy style.

That is why unhealthy spindle and extractor disk require to be changed to new ones. Such a negative situation on the one hand is the reason for increasing costs during preparation and use of machines in the cotton picking season, and it is the cause of increasing price of cotton picking in one hectare of field or to collect one ton of cotton on the other.

Despite of this, until now not any scientific and technological researches have been done in Uzbekistan regarding cone-shaped spindle and development of repairable extractor disks.

The main purpose of the current research material is to reach a technical improvement through increasing of reparability of HSM spindles and extractors. In order to achieve the target below mentioned scientific technological issues should be solved:

– To select a geometric shape of repairable disk-shaped extractor cogs;

– To find an experimental and a theoretical fundamental principles of technological width between a surface of the cone-shaped spindle and cogs as well as to find constructive principles of the disk-shaped cogs;

– To study the level of energy potential of an extraction process of cotton from horizontal cone-shaped spindle through the trapezoid cogs of the disk;

– To find constructive principles of experimental disk extractor and spindle cogs;

– To arrange test works in the fields and at special labs.

Conclusions

1. During three years (in 1996s, 1999s, 2000s) of examinations (examinations took place at the "Testing and certification center of irrigation technologies and technics of Uzbekistan ") of the two and four lined "Case-2022" HSM the main malfunctions happened with the spindle (66.2 %) and with humidifier unit (7.3 %).
2. Malfunctions in the spindle: the rod with cone-shaped teeth was broken to 27 mm in length (in 166 cases).
3. All 52 malfunctions in the extractor drum are involved with corrosion of the trapezoid teeth of the extractor disks.
4. Unhealthy spindles and extractor disk units are only being replaced with the new ones, because their design is not meant to be repaired.
5. These are the reparability requirements set for HSMs that are standardized and defined according to their technical and exploitation features: providing a technical service, repairing, keeping and transportation and technical diagnosis of a machine.
6. There were groups and categories developed in regards with the data evaluation of reparability of the HSM. And elements (a spindle, an extractor drum, a humidifier unit, cardan-shaft of the mechanism and others) were determined that impact to reliability of the machine.

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Climate change and its impacts on Amudarya river runoff

Abstract: This article analyzed the changes of River Amudarya during a long-year period, also had been collected and studied long-year database on air temperature changes over Uzbekistan. Based on the analyses have been given assessment on climate change impacts on the water runoff of the river Amudarya at present and in future.

Keywords: Amudarya river, climate, annual mean temperature, water resource, water-sheds.

Introduction. At present taken both globally or locally the annual mean temperature during the last 30–40 years keeps growing everywhere, which is already a recorded objective fact. According to the figures of researchers the level of the world sea waters during the last 100 years increased about 10–25 cm. and these changes took place due to air global temperature grow. It is known that because of human industrial activities at the last decades concentration of greenhouse gases grew in the atmosphere and it could be the main reason of temperature grow.

For all Central Asian Republics including also Uzbekistan which have enormous land farming recourses and agro-technical potentials the further climate aggravation (temperature changes, air pollution, precipitations, wind force and speed) could lead to equability destruction of interrelated system earth — water — climate.

Background materials. Our Scientific Research Institute of Irrigation and Water Problems during the last 30 years keeps a constant survey on air temperature changes, river runoff, water level, water supply and water use for agriculture needs. We collected a

huge database on water and climate change over Uzbekistan which now help us to make a conclusion how these changes took place and how they are going to develop in future.

Results and their discussion. It is known that water recourses at the Aral Sea basin are entirely consummated and limited. And water resources shortage exists at present too. The main causes are:

1. Enlarging irrigation areas at the river basin and consequently the increase of water usage for irrigation.
2. Man-made control for regulating seasonal and annual river streamflow by building of big water-pools.

Certainly the first factor is — enlargement of irrigation areas and increasing river water gates coming from river for irrigation all over the Basin of Amudarya River. Naturally the intensive growth of population in Central Asia is objective reality and food security consistently demands irrigation areas enlargement. The future enlargement of land must go side by side with implementation and development of high-tech water saving technology.

The second factor is the changes of Amudarya water routine system caused by big watersheds buildings at the issue of the river (as in Kirkizstan and Tajikistan).

According to its hydrological character Amudarya River is snow-glacier nutrition type of river. Formatting waters in natural conditions river is powerful enough to satisfy water needs all over the regions. However during the recent years connected with some big watershed buildings river started to function as a source of energy power system. Such man-made implied energy function at present leads to water shortage over the basin.

The third factor is the impacts of global and local climate change on river runoff.

The main index of global climate change considered to be above ground air temperature. In this given case that is at the down streams of river Amudarya climate change indexes are affected by following factors:

1. Impacts of global climate change.
2. Impacts of Aral Sea desertification.
3. Cutting the areas of irrigated lands inside the lake systems and wetlands.

As a rule, the first factor is a global problem and its impacts spread over the entire world.

The second factor is the Aral Sea desertification including delta lakes. This factor impacts only on a given area embracing the coastal belt of the sea.

The third factor is the desertification of an enormous lake and wetland areas, located inside irrigation lands and also reducing of rice plots (in 1980–1985 this area makes 110 thousands of ha.). These above mentioned objects some how could control the climate change factors forming this way a definite type of microclimate.

In whole global temperature change both over the basin and its downstream could be affected by the factor of global temperature increase, which in its turn causes air pollution and greenhouse gas emission. It is proved that even insignificant grow of air temperature could lead to extremely adverse impacts such as river water reduction and consequently reduction of irrigated lands and also public health aggravation.

Based on recorded materials has been made a graph of air temperature change (mid vegetation period) over Uzbekistan (t°C) and runoff of river Amudarya at the hydro-station of Kerki and Samanbay. Using data by Chub B. E. (2000) we tried to find interrelations between air temperature changes over Uzbekistan and Amudarya river runoff at the hydro-stations Chatli, Samanbay and Kerki.

In order to define the character of interrelation between air temperature and river water volume (W) using data by Chub B. E. (2000), have been made crooked graphs of mid annual index $W = f(t°)$.

The changeable volume of river runoff over long year period depends mainly on two factors:

– outgoing water gates dynamics for irrigation,
– climate change indexes.

It is known that during the initial period 1936–1955 (I, II, III, IV periods) water gates sizes for irrigation had been minimal. Since 1975 when intensive process of new land reclamation started consequently outgoing river water gates volume for irrigation rapidly increased, (Karshi steppe reclamation at the down stream of Amudarya and so on.).

The maximum indexes for water gates are noticed from 1980 to 1987 and starting from 1987 these indexes considerably decreased connected with reclamation of huge new irrigation lands. Figure 1 shows a diagram of air temperature changes at 1926–2014 and expected ones.

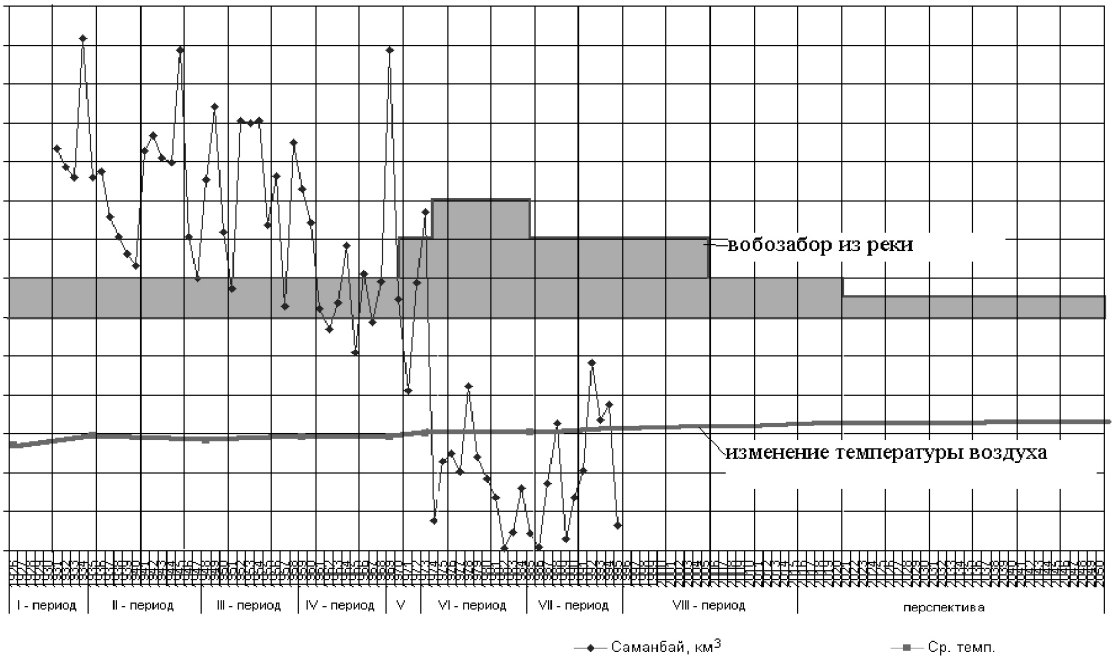

Fig. 1. Water gates sizes from the river and air temperature across Uzbekistan

As we see from the fig. 1 at the period 1926 to 1960–1965 water volume at the hydro station Samanbay was relatively unchangeable and shuttled between 30 to 65 km^3. Later connected with reclamation of enormous irrigating territories at mid and down stream of the river the volume of outgoing river water started to increase.

As it was mentioned above the main reason of runoff volume change of the river Amudarya during the vegetative period (April-October) mainly depends of two factors:

– water gates from the river (main factor);
– climate index changes.

At the period of 1926–1967, which embrace first three periods the volume of first factor (water gates for irrigation) was minimal. That's why river stream volume was relatively stable (with succession of full water and insufficient water years). Later started from 1967–1970 its volume decreased connected with the increasing of water gates for irrigation.

Maximum sizes of water gates noticed during the period of 1972–1985 and later during 1986–2005 its sizes became stable even during last years appeared to be a bit decreased.

According to researchers' anticipations in perspective at the period 2015–2025 is expected insignificant decrease of water gates for irrigation (in case insignificant or unchangeable sizes of irrigated area). For achieving this it is necessary a development and implication of water saving technology in the region.

What concerns to air temperature changes, so could be added that in future expected its incensement.

Conclusion:

The analyses of database on climate change indexes and river runoff shows the following:

1. Amudarya river runoff changes could be occurred affected by climate change factors which is mainly air temperature, and the water gate sizes out flowing from the river for irrigation could be stable or even decreased if in future water saved technology would be implied over the whole region.

2. In future, during 20–30 years is expected river runoff incensement due to air temperature grow, which will take place simultaneously with decreased glaciers and finally future decreased of the volume of the river streamflow.

3. We must take into consideration that global climate change is unavoidable and ceasing these processes demand enormous efforts with integrated activities and long period for results. However, must be taken steps to study air temperature growing on local and regional scale. Such activities are quite available and they will stop huge territory desertification, will develop sand fixation and create man-made wetlands and other processes.

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Water resources: the basis for the socio-economic development in the lower reaches of the Amudarya: a case study of Karakalpakstan

Abstract: The article analyzes the socio-economic situation of the lower reaches of the Amudarya river, caused by the shortage of water resources in the region. Studied in detail the condition and use of water resources in the region, identified the existing problems and on their basis conclusions are given.

Keywords: water resources, involvement, hydrological regime, water intake, flow decrease, agriculture, available water supply of the territory.

Introduction. The fate of the Priaralie region and further agricultural development in the lower reaches of Amudarya depend entirely on the water policies of Tajikistan, Uzbekistan and Turkmenistan. The emergence of a critical water situation during low water years (2000–2003), when the water availability in the upstream and middle-stream of the river fluctuated in the range of 80–85 %, and declined to 16 % in the northern regions of the Republic of Karakalpakstan, is evidence of this dependence. In low water years, ecological objects and agriculture in the lower reaches of Amudarya suffered from the lack of water in low-water years, whereas in the high water periods a critical situation emerged due to dam and structures breakages in the river delta.

The main causes of the emergence of such situations are:

- Lack of integrated policy on water resources management along the Amudarya River.
- Inconsistent operation regime of large reservoirs, such as Nurek and Tuyamuyun.
- Lack of accurate accountability of water withdrawal volumes along the river.
- No recognition of ecological water requirements of the river delta and the Aral Sea by the states.

The reduction in inflow of the river run-off to the Priaralie region has caused huge socio-economic damage, associated with deterioration of the environmental situation and loss from agricultural