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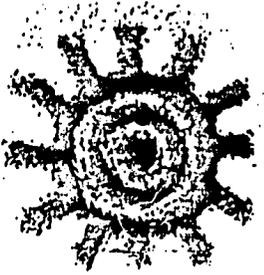
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DESERTIFICATION :  
A World Bibliography  
S O V I E T U N I O N

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for

23rd International Geographical Congress, Moscow, 1976  
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Desert Research Institute, Ashkhabad, Turkmen SSR

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University of Arizona  
OFFICE OF ARID LANDS STUDIES  
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## ACKNOWLEDGMENTS

As Editor, my greatest obligation in the preparation of this bibliography for publication is to Mrs. Jean Mills, Research Assistant, Office of Arid Lands Studies, who virtually lived for five months in the University of Arizona Libraries verifying information submitted by the several regional contributors, and then barricaded herself in her office while she reconciled a variety of styles to the format of our computer program that stores and retrieves from the data base comprising the Arid Lands Information System (ALIS).

The technical staff — Lynn Lybeck, Systems Analyst, Julie V. Garrettson in charge of terminal operations, and Eleanor Smith who assisted her with data entry — produced the document you hold in your hands, all of them sharing the often tedious work of modifying the computer program where necessary, entering the information on the terminal, reading proof three times, and doing the preliminary preparation of printouts for the photoreduction and photoreproduction that enabled us to compress these hundreds of citations into manageable size. My deepest thanks to all, not least for the interest they took in the project and in the subject as well. I hope each thinks of himself as a minor authority on desertification.

The backup support of the University of Arizona, and particularly that of the Office of Arid Lands Studies, is greatly appreciated. Our Director, Dr. Jack D. Johnson, stabilized the disruptions to the Office, inevitable in a project of this magnitude, by his enthusiastic cooperation. Mary Michael, Information Specialist, and Helen Kassander, Research Assistant, helped us meet our deadline by relinquishing their share of the technical staff's time over a period of months.

I am grateful to my colleague, Dr. Andrew W. Wilson, University of Arizona Department of Geography, Regional Development, and Urban Planning, and Vice-Chairman of the IGU Working Group on Desertification, for his counsel and advice during the year we worked on the bibliography, and to Professor Jack W. Mabbutt, Chairman, Department of Geography, University of New South Wales, Kensington, and Chairman of the IGU Working Group, for his willingness to allow me to go forward on the project in my own way. His keen eye and impeccable judgment sharpened my own approach to the undertaking.

To the collaborators throughout the arid world, as noted elsewhere herein, those recognized authorities on the regions represented by their citation contributions, who responded bravely to all my anguished cables to hurry, hurry, my very best thanks. The bibliography is really theirs, expressing as it does their understanding of particular environments and the impact of desertification thereon.

-Patricia Paylore

Tucson

July 4, 1976

## EDITOR'S PREFACE

This bibliography is a selection of largely recent information on worldwide desertification, a greatly expanded listing from that which accompanied a paper on the subject first published by the University of Arizona's Office of Arid Lands Studies in 1973\*. It has been compiled and edited for the 23rd International Geographical Congress, Moscow, 1976, more particularly for the Pre-Conference Meeting of the IGU Working Group on Desertification in Ashkhabad, July 1976, since it was under its aegis that the task was undertaken in the summer of 1975.

The Working Group came into being at the IGU's Montreal Congress, 1972, as a successor to the former Commission on the Geography of Arid Lands. Its stated aim was "to collect evidence on the nature and causes of environmental changes constituting an extension of deserts into marginal areas or an intensification of desert conditions within arid regions." Two subsequent field meetings of the Working Group were held: in Alice Springs in the early winter of 1974; and in Cambridge, England, in the early fall of 1975. When the Editor was co-opted to the Working Group, it was agreed that she would depend to a large degree on contributions from various regional collaborators for coverage of specific areas. Those persons are listed here, many of whom are also authors of the brief introductory remarks which precede most sections of the bibliography itself:

Worldwide:	Ronald F. Peel, University of Bristol
Saharan Region	A. T. Grove, Cambridge University (English)
and Sahel:	Monique Mainguet, Reims University (French)
	Horst Mensching, University of Hamburg )
	F. N. Ibrahim, University of Hamburg ) (German)
	Wolfgang Meckelein, University of Stuttgart )
East Africa:	Leonard Berry, Clark University, Worcester
Southern Africa:	Peter D. Tyson, University of Witwatersrand
Middle East:	Peter Beaumont, University of Durham
USSR:	Michael Petrov, Leningrad University
Pakistan:	Mushtaqur Rahman, Iowa State University
India:	H. S. Mann, Central Arid Zone Research Institute, Jodhpur
Australia:	J. A. Mabbutt, University of New South Wales
South America:	Hans J. Schneider, University of New South Wales
North America:	Andrew W. Wilson, University of Arizona

Many of the Regional Organizers have been assisted by local correspondents, who are in effect Corresponding Members of the Working Group.

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\* Sherbrooke, W. C. / Paylore, P. (1973) World Desertification: Cause and Effect. A Literature Review and Annotated Bibliography. University of Arizona, Office of Arid Lands Studies, Arid Lands Resource Information Paper 3. 168 p.

The following framework was suggested to the regional contributors early in the project, as a guide to selection of references. While not all items are represented in each gathering, the presence of citations dealing with any of these concepts can be determined from the index for each region.

A. Natural Trends:

1. Climatic changes in the historical period
2. Hydrologic changes
3. Changes in landforms due to the action of water
4. Changes in landforms due to the action of wind
5. Changes in soils
6. Changes in natural vegetation

B. Man's Influence on the Processes of Desertification:

1. Agriculture, dryland or irrigated
2. Pastoralism, rural settlement, and nomadism
3. Forestry, with emphasis on collection of fuel
4. Urbanization
5. Population changes
6. Mining (including oil and gas) and pipeline construction
7. Transportation, including construction of roads, railways, airfields
8. Tourism and recreation

C. Preservational Measures:

1. Studies of status and trend of the environment
2. Regional assessments of natural resources
3. Studies of natural hazards
4. Establishment of natural parks and reserves
5. Other controls of land use

D. Preventive and Remedial Measures:

1. Climate: climatic stress, rainmaking, evaporation suppression, shelterbelts
2. Water supplies: inventories of water resources, water balance or hydrologic cycle, improvement of supplies for drinking, stock or irrigation; water harvesting schemes
3. Erosion control: stabilization of dunes and drift sands, monitoring of processes, measures against water and wind erosion
4. Improvement of desert vegetative cover: surveys of the extent of degradation, range and grazing studies, revegetation of bare areas, pasture improvement, afforestation
5. Control of land use: pastoral, dryland / irrigated agriculture
6. Control of population and settlement: nomads, rural settlement, urban planning, communications
7. Development of alternative resources: regional development, mining, industry tourism, recreation, health care

It was also suggested that we attempt to keep within a timeframe of the past decade. This was done to a large extent, but earlier papers of a classic nature are still included where it is generally agreed that their presentation has not been improved upon.

Because of the massive infusion of bibliographic information, which (even with what, at times, must have appeared to be brutal editorial cuts) still far exceeds the total number of references envisaged when we began, we have had to be arbitrary in the manner in which we have handled some of the information. Where we have departed radically from the format employed to display the greatest percentage of information, such as the USSR, we have appended an explanation following the regional contributor's Introduction. We have included several hundred documents from our own Arid Lands Information System (ALIS) to enhance the coverage submitted by our regional colleagues.

Much work was done at Arizona to bring these hundreds of references into the format required by our computer program. Many references were dropped because of lack of adequate information to identify and locate copies should users so require. For those without the services of skilled documentalists and/or bibliographers to call upon, it has always seemed to us that our meticulous and sometimes fussy insistence on full bibliographical information is the sine qua non of good bibliography. In this respect, while much of the documentation in this bibliography was very difficult indeed, we believe that the smallest percentage humanly possible is included that has not been verified by our staff. We trust, therefore, that because of this care, users will find the full documentation more readily accessible than they would otherwise.

Indexing (except for the USSR) was done from the Thesaurus of Arid Lands Terminology (c1974), developed and used by the Office of Arid Lands Studies for its computerized data bank; and to make the use of the bibliography less cumbersome, subject keywords and authors appear as computerized lists following each section. The documentation from the USSR was sorted out into ten overall categories, and no indexing of individual citations was undertaken.

An effort was made to eliminate all references that did not contribute to an understanding of the phenomenon of desertification itself, rather than to permit the bibliography to become a general arid lands compilation. That we did not always succeed must be attributed not only to our inability to distinguish at times, but also to the disagreements and confusion existing among desert experts as to exactly what constitutes desertification. For those users who miss their favorite citations - their own or others - we ask you to take this constraint into account.

The Editor takes full responsibility for the choice of references carried, and for all shortcomings of coverage or format. I hope the latter will be outweighed by the work's overall usefulness at this critical time in the world's understanding of a biological and physical process that is affecting the lives of millions.

SOVIET UNION

Professor M. Petrov  
Department of Geography  
Leningrad University  
Leningrad  
USSR

## SOVIET UNION

In the arid zones of the USSR desertification so far is relatively confined in extent to the semi-desert and sand deserts of such areas as the Karakum, the Kyzylkum, and Ustyurt, where as yet anthropogenic influences have had little impact. It is here that the dynamic equilibrium of the ecosystem is less stable and self-regeneration uncertain.

In the near future, however, anthropogenic impacts on the deserts and semi-deserts of the USSR may be accelerated, as evidenced by the objectives of various plans for economic development in the Republics of Middle Asia and Kazakhstan in the tenth 5-year plan. Scientific literature demonstrates a growing recognition that these objectives will be realized only through firm observance of the rational use of natural resources, based on a thorough scientific understanding of their dynamics, and their restoration where required.

Long-term forecasts of the physico-geographic processes in these regions of projected intense human activity on a landscape less likely to withstand these impacts than other environments will require an analysis of the inter-relationship of all factors bearing on this complex situation. Such long-term forecasting can be done only with the aid of mathematical and physical models, including those relating to natural processes.

The term desertification is in little use in the USSR, with more highly individualized terminology being favored, such as pasture degradation, soil deflation, deforestation, formation of moving sands, salinization of soils and groundwater. This reflects the preponderance of work in the USSR on overgrazing, stabilization of shifting sands, total removal of vegetative cover for fuel without regard for its regenerative capacity, and the action of wind and water erosion on surface materials. These impacts are most noticeable in marginal areas of semi-desert environments, where the processes of natural afforestation and regeneration can be accelerated by intelligent efforts at phytoreclamation.

### SOVIET UNION: An Editorial Note

The references furnished us by Academician Petrov posed some particular problems inherent in the language. After consultations with Wilson and Mabbutt, the decision was made to translate titles and annotations, and transliterate authors and sources. There are a few discrepancies, but in each of these cases there was reason to do so.

We believe that the sorting out of these several hundred citations by large subject categories, in lieu of the keyword indexing done for the other sections, will serve users adequately in this instance.

It is apparent from the USSR display that Soviet activities are being reported with considerable currency, since most citations retained for this bibliography bear a date of 1970 or later.

For the translation / transliteration work, we are indebted to Mr. Theodore Guerchon, a professional translator for the U. S. Joint Publications Research Service, and to Miss Janice Chlopowicz, University of Arizona. For the several instances in which I departed from their advice, I take full responsibility.

## SAND CONTROL

Aflyatonov, F. S./Gabay, V. S./Podgornov, A. S. (1970) Opyt primeneniya nerozina dlya zakrepleniya i zarashchivaniya peskov na trasse gazoprovođa Bukhara-Ural (Experimenta use of nerosine for the fixation and cultivation on sands along the track of the Bukhara-Ural gas pipeline). Vnialmi, Volgograd.

Technique for applying nerosine for the protection of the pipeline from blowing sand in Kyzylkum, effectiveness and cost.

Akhmedov, K. S. et al (1970) Zakrepleniye podvizhykh peskov vodnymi rastvorami polimerov (Fixing shifting sands with polymer water solutions). Uzbek SSR, Tashkent, Gosplan Institute of Scientific and Technical Information. 8 p.

Brief description of polymers K-4, PAA, and ARM-15 latex and method of their use in sand fixation.

Arnagel'dyyev, A. (1975) Peski tsentral'noy chasti nizmennykh Karakumov, ikh podvizhnost' i mery bor'by s neyu (Sands of the central part of the lower Karakums, their mobility, and measures against it). USSR Academy of Sciences, Moscow, Geography Institute (Candidate dissertation summary). 25 p.

Azizov, A. et al (1975) Cement-sand mixture cellular mechanical screen. Problemy Osvoyeniya Pustyn' 1:85-89.

Babayev, A. G. (1973) Oazisnyye peski Turkmenistana i puti ikh osvoyeniya (Oases sands in Turkmenistan and methods for their development). Ylym, Ashkhabad. 353 p.

Classification of sands. Description of sands at the Murgab, Tedzhen, Sredne-Nizhne Amu Dar'ya and Prikopetdag oases (forest vegetation conditions, types of sands). Basic measures related to the fixation, afforestation, and agricultural development of oases sands.

Babayev, A. G./Cherednichenko, V. P. (1972) Method for determining the degree of deflation in shifting sands. Problemy Osvoyeniya Pustyn' 5:41-45.

Classification of types of sand surface according to degree of deflatability.

Bayramov, S. B. (1971) Shifting sands in western Turkmenia and the struggle against them. In Prirodnyye usloviya i podvizhnyye peski pustyn' (Desert natural conditions and shifting sands), p. 141-148. Ylym, Ashkhabad.

--- --- (1971) Study of deflationary processes in sandy deserts. Geomorfologiya 2:45-49.

Besedin, P. N./Mirzazhanov, K. M. (1971) Reclamation of intra-oases shifting sands. Soyuznikhi (All-Union Scientific-Research Institute of Cotton Growing), Trudy 20:102-117.

Cherednichenko, V. P. (1971) Principles for the protection of pipelines from sand blowing. Problemy Osvoyeniya Pustyn' 4:79-83.

--- --- (1972) Geomorphological substantiation of the designing and laying of pipelines in the desert. Geomorfologiya 2:34-39.

Research methods and practical recommendations for the protection from drifting sands of the central Asla-center and Bukhara-Ural pipelines.

--- --- (1973) Morfologiya eolovogo rel'yefa i stroitel'stvo truboprovodov v pustyn' (Morphology of eolian topography and pipeline laying in the desert). Ylym, Ashkhabad. 130 p.

Types of topography and their origins along the track of the gazli-kungrad gas pipeline (southwestern Kyzylkums, Zaunguz Karakums, and Amu Dar'ya River delta). Practical recommendations on pipeline laying and protection from sand drift.

- Danilin, A. A. (1975) Computation of sand consolidation measures in the Karakum canal zone, Turkmen SSR. Tashkentskogo Sel'skokhozyaystvennogo Instituta, Nauchnyye Trudy 50:100-109.**
- Fazilov, T. I. (1972) Protection of railway tracks from sand drifts through fixatives. Problemy Osvoyeniya Pustyn' 3:84-87.**  
Positive results of bitumen and petroleum sand fixation. Sand granulation method. Costs.
- Fomina, A. S. (1971) Nerosine - a chemical for the struggle with soil erosion. In Zashchita pochv ot erozii (Protection of soils from erosion), p. 252-254. Kolos Publishing House, Moscow.**  
Results of 60-year tests in various agricultural sectors.
- Gabay, V. S./Podgornov, A. S./Shamshina, V. A. (1973) Rekomendatsii po primeneniyu nerozina dlya zakrepleniya i zarashchivaniya posvizhnykh peskov v polupustynnykh i pustynnykh rayonakh SSSR (Recommendations on the use of nerosine for the fixing and planting on shifting sands in semi-desert and desert regions in the USSR). Vnialmi, Volgograd. 13 p.**  
Aerial and ground nerosine application methods and sowing methods. Economic effectiveness.
- Ivanov, A. P. (1972) Physical principles of deflation on sandy deserts. Ylym, Ashkhabad. 112 p.**  
Discusses application of aerodynamic principles to amelioration of sand drifts across roadways.
- (1975) Complex methods for the protection of highways from sand drifts in shifting sand conditions. Problemy Osvoyeniya Pustyn' 6:87-89.**
- Ivlev, N. P./Ponandopulo, G. A./Ryl'kov, A. V. (1972) Experiment in the use of bitumen emulsions in the fixation of barkhan sands. Trudy Soyuzdornii 57:109-120.**  
Practical recommendations on the use of bitumen brands BND-200/300 and BND-130/200 in sand fixation.
- Kuchkarov, M. (1975) Ekonomicheskaya effektivnost' zakrepleniya i obleseniya peskov (Economic effectiveness of sand fixation and afforestation). Uzbekistan, Tashkent. 32 p.**
- Leont'yev, A. A./Kim, V. K. (1973) New methods for sand fixation and afforestation. In Zashchitnoye lesorzvedeniye na peschanykh territoriyakh sredney Azii (Protective forestry growing on sandy territories in central Asia). Nauchnyye Trudy Sredaznikh (Tashkent) 15:32-46.**  
Description of methods for sand fixation using various covers (petroleum, nerosine).
- Leont'yev, A. A./Sabitrov, M. (1971) Fixation and afforestation of the sands along the track of the Bukhara-Amu Dar'ya gas pipeline and the Amu Dar'ya-Bukhara canal. In Prirodnnyye usloviya i podvizhnyye peski pustyn' (Desert natural conditions and shifting sands), p. 157-169. Ylym, Ashkhabad.**  
Study of various types of mechanical protective shields. Characteristics of phytoreclamation works and pipelines.
- Leont'yev, A. A./Sabitrov, M. K./Kim, V. I. (1975) A new method for fixation and afforestation of technogenic sands. Lesnoye Khozyaystvo 10:57-58.**
- Mirakhmedov, M. (1975) Zakrepleniye podvizhnykh peskov tyazhelymi neftyami (Fixation of shifting sand with heavy oils). Tashkent Polytechnical Institute, Tashkent (Candidate dissertation summary). 26 p.**
- Mirzazhanov, K. (1972) Spetsial'nyye metody zakrepleniya vnutriozisnykh podvizhnykh peskov i ispol'zovaniye pogrebennykh pochv (Special methods for the fixing of intraoasis shifting sands and the use of buried soils). Uzbekistan, Tashkent. 31 p.**
- Nikolayev, V. N. (1975) On the protection of highways from sand drifts in the Murgabskaya plain. Problemy Osvoyeniya Pustyn' 1:92-95.**
- (1975) On urgent measures for the protection of soils from wind and water erosion. 24 May 1967 Communist Party of Kazakhstan, Central Committee, and Kazakh SSR Council of Ministers Decree No. 375. In Okhrana prirody v Kazakhskoy SSR (Environmental protection in the Kazakh SSR), vol. 1, p. 331-335. Kaynar, Alma-Ata.**

- Ovezliyev, A. O./Svintsov, I. P. (1972) Protection of the planned track of the fourth Karakum canal section from sand drifts and deflation. *Problemy Osvoyeniya Pustyn'* 4:70-75.  
Forest vegetation conditions and enumeration of practical recommendations.
- Palagashvili, V. M. (1974) *Primeneniye bitumnykh emul'siy dlya zakrepleniya podvizhnykh peskov* (Use of bitumen emulsions for the fixation of shifting sands). Moscow Railway Transportation Engineers Institute (Candidate dissertation summary). 24 p.
- Podgornov, A. S./Kim, V. I. (1972) Nerosine, an effective preparation for sand fixation along tracks of main gas pipelines. *Problemy Osvoyeniya Pustyn'* 1:81-84.  
Positive assessment based on an experiment conducted along 153 kilometers of the Bukhara-Ural (Kyzylkum) gas pipeline.
- Ryabikhin, E. L./Bayramov, S. B./Kazakova, L. N. (1975) Dynamics of shifting sands in Dardzhakum massif (western Turkmenistan). *Problemy Osvoyeniya Pustyn'* 1:34-39.
- Safarov, I. (1973) Protection from wind erosion of the Amu-Bukhara canal dikes. In *Vetrovaya eroziya i agrolesomelloratsiya v Uzbekistana* (Wind erosion and afforestation in Uzbekistan), p. 37-41. Tashkent Agricultural Institute, Scientific Works 39.  
Diagram of sand fixation with mechanical screens.
- Shamshin, V. A. (1973) *Primeneniye nerozina i drugikh skleivayushchikh khimikatov klya vosstanovleniya kormovykh ugodly na Prikaspiyskikh Peschanykh zemlyakh* (Use of nerosine and other fixative chemicals in restoring fodder lands on sandy soils around the Caspian Sea). Volgograd Agricultural Institute, Volgograd (Candidate dissertation summary). 19 p.
- Stepanov, A. M. (1971) The effect of shelter on the temperature and moisture of desert sands. *Soviet Geography: Review and translation* 12(10):695-701. Translated from *Problemy Osvoyeniya Pustyn'* 1969, No. 4. SWRA W72-07044. MGA 237-492.  
The role of desert mechanical shelter is usually associated with a desire to reduce wind speeds in the surface layer, prevent sand drifting and protect plants against wind erosion. Its significance with respect to moisture accumulation and conservation is generally ignored. Investigations in the Karakum desert on mechanical shelters, including covering sand binders and standing windbreaks, revealed that such structures reduced wind speed in the surface layer resulting in an attenuation of sand drifting. At midday, the shelters reduced sand temperatures by as much as 2.5 degrees centigrade on south-facing slopes and by about twice as much on north-facing slopes. Combinations of slope and windward and lee sides of barriers were even more effective. The stabilized dunes lost 60 percent less moisture. Standing windbreaks did not produce sand desiccation. The lee side on south-facing slopes and the windward side on north-facing sand dune slopes were the areas of decreased sand temperature combined with increased moisture that resulted in optimal plant growth.
- Svintsov, I. P. (1972) Protection of highways from sand drifts in the Karakums. *Avtomobil'nyye Dorogi* 12:18-20.
- Vakulin, A. A. (1973) *Osvoyeniye peskov* (Development of sands). Kalmyk, Elista. 138 p.  
Afforestation, fixing, and agricultural development of Kalmyk ASSR sands.
- Zakirov, R. S. (1975) Complex protection of railroads from sand drifts. In *Voprosy proyektirovaniya i stroitel'stva zheleznodorozhnykh lliniy sredney Azii i Kazakhstana* (Problems of designing and construction of railway lines in central Asia and Kazakhstan). *Trudy Tashitt* (Tashkent) 115: 9-16.

## AFFORESTATION

- Adil'bekov, R. O. (1975) On the complex mechanization of protective afforestation in Central Asian sands. *Problemy Osvoyeniya Pustyn'* 5 : 70-74.
- Artykov, K. (1975) Agrometeorological conditions for the survival of shrub shoots in the foothills of south-eastern Turkmenistan. *Problemy Osvoyeniya Pustyn'* 4 : 78-81.
- Danilin, A. L. (1969) *Lesorastitel'nyye usloviya peskov tsentral'noy fergany i metody ikh zakrepleniya i obleseniya* (Forest vegetation conditions of central Fergana sands and methods for their fixation and afforestation). Tashkent Agricultural Institute, Tashkent (Candidate dissertation summary). 29 p.
- --- (1973) Forest vegetation conditions of sands in the Karakalpak ASSR and methods for their afforestation. *Tashkentskogo Sel'skokhozyaystvennogo Instituta, Nauchnyye Trudy* 42 : 3-13.  
Characteristics of hydrothermal conditions. Characteristics of timber stock.
- Egamberdyev, R. (1965) *Biologicheskiye osnovy vvedeniya v kul'turu khvoynika shishkonosnogo v usloviyakh pustynnykh pastbishch Uzbekistana* (Biological foundations for the cultivation of coniferous Ephedra under the conditions of Uzbek desert pastures). Samarkand University, Samarkand (Candidate dissertation summary). 20 p.
- Fakhrutdinov, F. F. (1968) Fixation and afforestation of shifting sands in central Fergana. *Khlopkovodstvo* 10 : 30-31.  
Positive results of forest reclamation work: agrotechnology, costs, effectiveness.
- Gayel', A. G. (1975) Afforestation of arid Aral-Caspian areas. *Lesnoye Khozyaystvo* 3 : 27-30.
- Gvozdkov, A. V. (1972) Characteristics of psammophyte timber-shrub species with a view to variety selection in the development of Central Asian deserts. In *Lesovodstvo i lesomelloratsiya* (Forestry and forest reclamation). Tashkent Agricultural Institute, Nauchnyye Trudy 25 : 3-22.  
Morphology, ecology, forest reclamation significance, cultivation methods, timber stock.
- Ishankuliev, M. (1975) *Sredoobrazuvayushchaya rol' kustarnikov v vostochnykh karakumakh (Na primere Repeteka)* (Environment-shaping role of shrubs in the eastern Karakums (example, Repetek)). Turkmen SSR Academy of Sciences, Ashkhabad, Institute of Botany (Candidate dissertation summary). 26 p.
- Ivanov, A. Y. (1969) Fixation, afforestation, and agricultural utilization of sands. In *Proyektirovaniye i vyrashchivaniye zashchitnykh lesonasazhdeniy* (Planning and cultivation of protective afforestation), p. 155-197. *Lesnaya Prom-st'*, Moscow.  
Basic information on sands, methods of their fixation and afforestation (mechanical protection, chemical methods, forest land reclamation). Agricultural development of sands and sandy soils.
- Ivanov, A. Y./Kulik, N. F./Gabay, V. S. (1968) *Rekomendatsii po kompleksnomu osvoyeniyu peskov yugo-vostoka yevropeyskoy chasti RSFSR* (Recommendations on the complex development of sands in the southeast of the European part of the RSFSR). *Lesnaya Prom-st'*, Moscow. 52 p.  
Fixation and afforestation of shifting sands. Improvement of pastureland, crop growing, truck gardening, and viticulture.
- Ivanov, A. Y./Dryuchenko, M. M. (1969) *Kompleksnoye osvoyeniye peskov* (Complex development of sands). 2d ed. *Lesnaya Prom-st'*, Moscow. 302 p.  
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