

Ginseng Research in Russia During The Past 20 Years

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Ginseng researches in the Russia during last two decades (1975-1995), were reviewed especially experimental with data of interactions of saponines from *Panax ginseng* C. A. Meyer on membranes. The publications on researches of ginseng were about 200 in total (papers and monographs) for 1975-1995 in Russia.

1. Ginseng, *Panax ginseng* C. A. Meyer, grows in the latifoliate forests of Primorie and Khabarovsk region in the Far East of Russia. Not much stock of ginseng in forest does not allow to provide enough raw materials to medicine industry. From 1963 in Russia, the works on ginseng, that is cultivating, researching of agriculture and biology, and gene selection have been carried out. The zones of cultivating ginseng are Primorie, middle part of Russia, Siberia, Ukraine, Belorussia and North Caucase.

The technology of ginseng cultivation permits up to 1 ton. of dry root of ginseng in one hegtare. Many aspects of biology and cultivation of ginseng are elucidated in the monograph Malyshev A. A., Ginseng: Biology and cultivation, 1986.

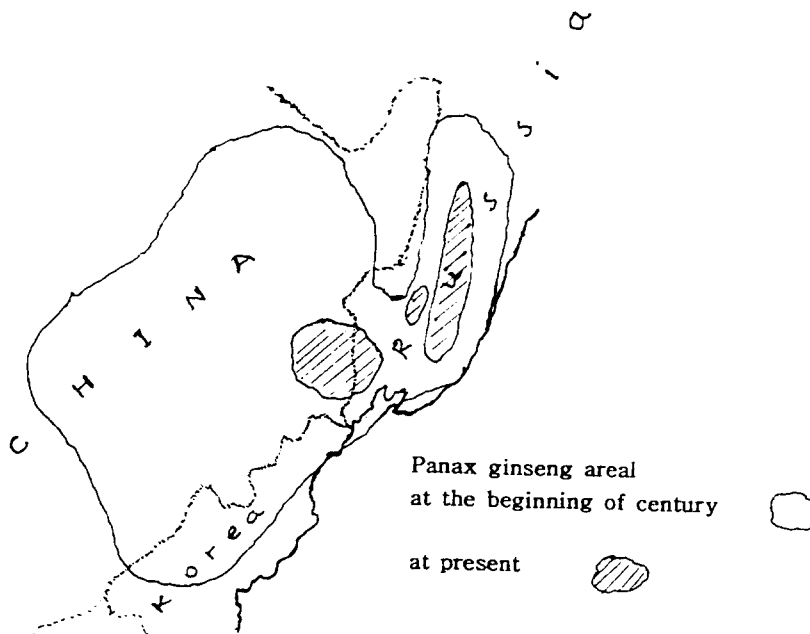
2. Cell culture of ginseng was carried out in Russia for the first time in the world and then technology of cell culture on the industrial scale followed. The collection of ginseng strains is obtained including various mutant type and wild type strains of *Panax ginseng*, *Panax quinquefolius* L., and *Panax japonicus* by using cell selection method. The researches of cell culture is carried out in the Timiryasev Institute of Plant Physiology (Moscow).

3. The pacific Institute of Bioorganic Chemistry (Vladivostok) focused on the researches of analysis of chemical components in cell culture

suspensions. The principal active components of *Panax ginseng* cell extract were beta-D-glucoside of beta-sitosterin and the glucoside of oleanolic acid. In this Institute, wide researches of synthesis of glycosides, that is triterpenoid of dammarane series were carried out. Protopanaxadiol was synthesized from betulofolien-triol in leaves of birch.

4. To comparative with other countries (Korea, Japan, China), the publications in Russia are not much in the researches of Pharmacology and Immunology. In 1976 Prof. Brekhman said that future of pharmacology definitely belongs to pharmacology of health than treatment. Scientists have been studying in many aspects of ginseng, including anticancer activity and effects on immune system, central nervous system, immobilization stress and alloxan diabets, and many others. Many scientists have shown that a tincture of tissue culture biomass of ginseng cells has immunomodulatory effect on humoral immunity. It was shown that polysaccharide fractions isolated from two lines of ginseng tissue culture activated the effector functions of polymorphonuclear leucocytes and macrophages.

5. Clinical studies are applied for prevention of atherosclerosis, management of adjuvant therapy in revitalization, and assessment of its tonic activity.



DISTRIBUTION of WILD PANAX GINSENG

Some characteristic of various *P. ginseng* strains

Strain	Mode of obtained	Nutrient medium	Number of chromosomes	Number of cells in suspension aggregates	Dry mass g/1 day/flask	
					callus	suspension
IPhR G1	Root of wild plant	MS, Kinetin NAA, m-insoitol CH	50-100 6-10	0.42	1.5	-
IPhR G2	Var. selected from IPhR G1	MS, NAA	41-136	6-20	0.50	2.0
IPhR G3	- " -	MS	28-400	11-30	0.21	0.7
IPhR G11	mutant from IPhR G1 (N-NMM)	MS, kinetin NAA	54->200	-	-	-
IPhR G12	- " -	- " -	30-90	-	0.60	-
IPhR G13	- " -	- " -	30-107	-	-	-
IPhR G14	- " -	- " -	28-112	-	-	-
IPhR G15	- " -	- " -	48-154	-	-	-
IPhR G16	- " -	- " -	43->200	-	-	-

6. Study of biophysical mechanism of interaction of ginseng components with membranes. (Experimental data of authors).

Depending on the concentration of substances and lipid composition of the membrane Panaxatriol, Panaxadiol and ginsenoside Rg₁ formed two types of ion-conducting structures : with low and large conductances. Ginsenoside Rb₁ began to increase the membrane conductance at concentration of about 60ug/ml. However, as against of other substances did not observe the single channel fluctuation. The effect of total saponine and glycosides and their aglicons on thermodynamic parameters of model membranes

from dipalmitoylphosphatidilcholine (DPPC) are investigated. The total saponine interacted with gel phase of lipid in polar region and does not penetrate deeper glycerol backbone of lipid molecule. Panaxadiol and ginsenosides Rb₁, Rg₁ poorly influenced on the phase transition. The total saponine and panaxadiol at high concentration (10ug/ml) influenced on the phase transition of mixture of DPPC:Chol. Total saponine influenced specifically all erythrocyte membrane transitions in a concentration-dependent manner, i.e. on the structures of all the main membrane skeleton proteins.

The chemical compositions of cell cultured biomass(St.G1) and root P. ginseng

No	Substances	Content, % per dry mass	
		Cell biomass	Root
1	Protein N	1.18	1.68
2	Non-protein N	4.82	2.73
3	Sucrose	1.03	3.07
4	Glucose+Fructose	2.28	3.12
5	Starch	5.40	19.5
6	Cellulose	9.84	10.24
7	Pectins	15.40	15.80
8	Lipids	1.61	2.34
9	Volatile oils(Panacenes)	traces	0.05
10	Phytosterols	0.9	0.8
11	Ginsenosides	3.21	3.12