*Липоксигеназная система при действии фитогормонов гипоксии у двудольных растений, сортовые и межвидовые различия*

# *Lipoxygenase system under phytohormones and hypoxia in dicotyledonous plants, varietal and interspecific differences*

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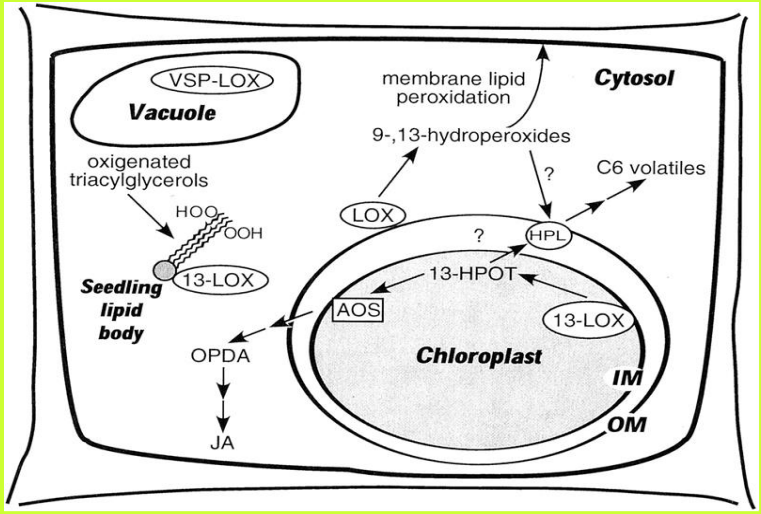
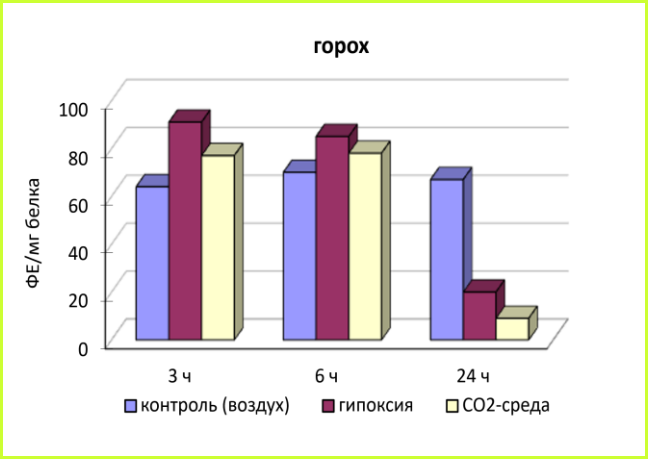
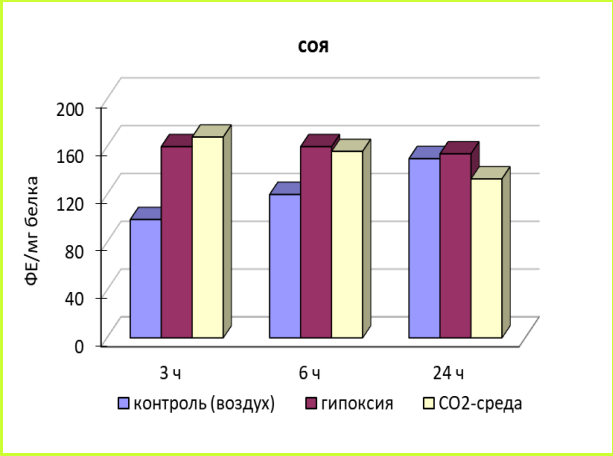
**Lipoxygenases** *(EC 1.13.11.12)* catalyze oxidation of polyunsaturated higher fatty acids free and bounded in phospholipids with hydroperoxyl derivative formation launching a chain of free radical processes (FRP) in cells

***Materials and methods***: 10-day-old seedlings of dicotyledon pea (Pisum sativum L.) and soy (Glycine max L.) plants hydroponically grown under 12h photoperiod and +22˚C served as study objects. Aerial part of plant was placed in dark conditions for 3-24h in different gas media. To investigate impact of kinetin and 24-epibrassinolide, these phytohormones were preliminary inserted by transpiration stream (10 mg/l). LOX activity was determined in tissue homogenate or mitochondria spectrophotometrically by accumulation of hydroperoxides under λ=234 nm with linoleic acid as a substrate. Enzyme activity was calculated in EU/mg of protein which content was determined by Lowry.




Proposed model of the compartmentalization of LOXs and other enzymes of the oxylipins pathway(**Porta Mario. Rocha-Sosa,2002)**




Under hypoxic stress the LOX activity was increasing in intolerant pea seedlings up to 400% while in more tolerant soy only up to 60% during first 3-6h of hypoxia and then decreasing in both plants.

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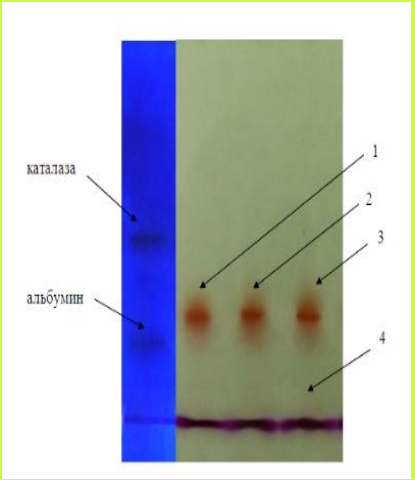
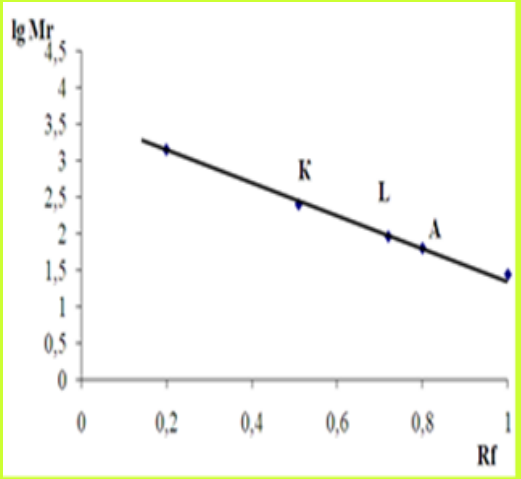
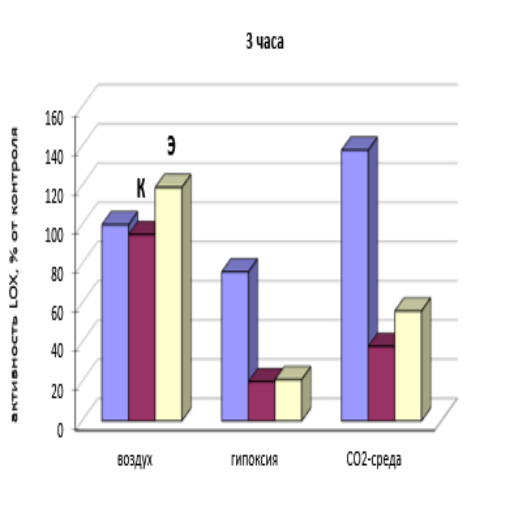
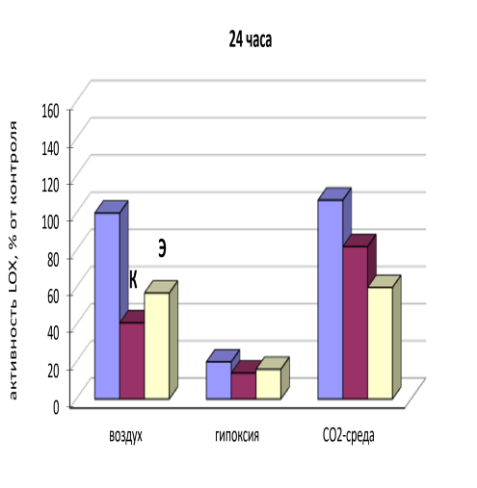
It was shown that input to hydroperoxide accumulation was given by not only cytoplasmic but also mitochondrial form of LOX which activity was increasing by nearly 80% in first hours of hypoxia in pea seedling and only by 45% in more tolerant soy seedlings and later was decreasing



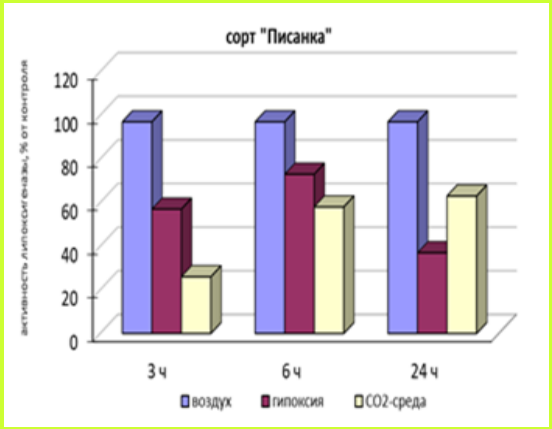

Mitochondrial form of LOX

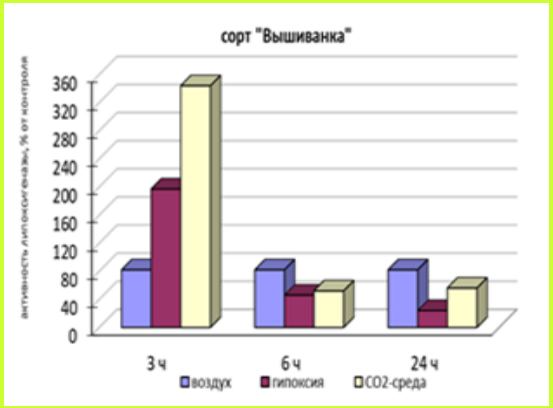


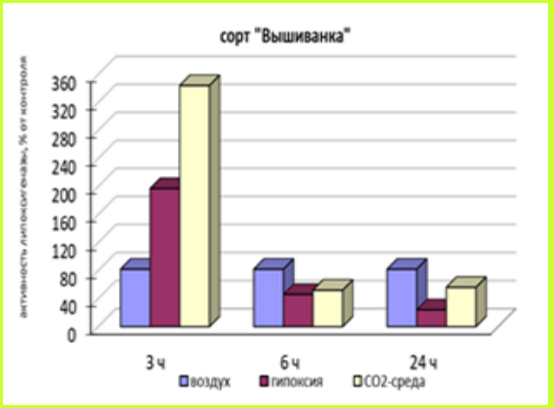




*To reduce stress impact the phytohormones acting on levels of metabolic processes and genes activity got involved. Our experiments showed that plant treatment by phytohormone kinetin decreased activity of mitochondrial LOX of pea seedlings in all test variants*

Over the last years was shown that there are not only interspecies but also varietal special aspects of cultivated plants for metabolite content and stress tolerance However varietal aspects of cultivated plants responsiveness under stress factors are better studied for cereal crops (rice, wheat)




It was noted that in plants of “Belgorodskaya 48” LOX activity was increasing by 120-175% and in “Vyshivanka” by 215% in first 3-6h of hypoxia. In soy plants of “Pisanka” no increase of LOX activity under all durations of hypoxic stress was noted.

***Conclusions:*** *Overall results confirm existence not only species differences but also varietal aspects of soy reactions on FRP and LOX activity process levels which can be used in sort selection processes for specified growth environments. Application of phytohormones kinetin and 24-epibrassinolide allows to affect the speed of ROS formation which is important for tolerance increase to stress for dicotyledon plants and specifically soy due to its acreage growth driven by breeding of northern ecotype varieties*