Published data and results of our studies concerning the involvement and role of jasmonic acid in the regulation of plant physiological and biochemical processes have been analyzed and summarized. The basic stages of jasmonates synthesis are reviewed. Properties of enzymes involved in jasmonate biosynthesis are described. Data on the jasmonic acid involvement in the regulation of seed germination, maintaining of aging processes, sex determination, cellulose synthesis, features of interaction with ABA as well as in gene expression, formation of the immune system in stress and pathogene effect conditions are presented. Jasmonic acid effects on the cell ultrustructure are discussed. Prospects of using jasmonates in biotechnology are dealt with.

**Key words**: biotechnology of jasmonic acid, regulation of metabolism reactions.
3.  Parthier B. Jasmonates: hormonal regulators or stress factors in leaf senescence? *J. Plant Growth Regul*. 1993, V. 9, P. 57–63.

4.  Sembdner G., Parthier B. The biochemistry and the physiological and molecular actions of jasmonates. *Ann. Rev. Plant Physiol*. 1993, V. 44, P. 569–589.

5.  Wasternack C. Jasmonates: an update on biosynthesis, signal transduction and action in plant stress response, growth and development. *Ann. Bot*. 2007, V. 100, P. 681–669.

6.  Wasternack C., Forner S., Strnad M., Hause B. Jasmonates in flower and seed development. *Biochimie*. 2013, V. 5, P. 79–85.  
   [http://dx.doi.org/10.1016/j.biochi.2012.06.005](http://dx.doi.org/10.1016/j.biochi.2012.06.005)

7.  Turner J. G., Ellis C., Devoto A. The Jasmonate Signal Pathway. *The Plant Cell*. 2002, V. 14, P. 153–164.

8.  Zalewski K., Nitkiewicz B., Lahuta L. B., Glowacka K., Socha A., Amarowicz R. Effect of jasmonic acid-methyl ester on the composition of carbohydrates and germination of yellow lupine (Lupinus luteus L.) seeds. *J. Plant Phys*. 2010, V. 167, P. 967–973.  
   [http://dx.doi.org/10.1016/j.jplph.2010.01.020](http://dx.doi.org/10.1016/j.jplph.2010.01.020)  
   PMID:20417986

9.  Hause B., Wasternack C., Strack D. Jasmonates in stress responses and development. *Phytochemistry*. 2009, V. 70, P. 1483–1484.  
   [http://dx.doi.org/10.1016/j.phytochem.2009.07.004](http://dx.doi.org/10.1016/j.phytochem.2009.07.004)
10. **Tarchevskiy I. A.** Elicitors – induced signaling systems and their interaction. *Fiziologiya rasteniy*. 2000, V. 47, P. 321–331. (In Russian).

11. **Hamberg M., Hughes M. A.** Fatty acid allene oxides. III. Albumin-induced cyclization of 12,13(S)-epoxy-9(Z), 11-octadecadienoic acid. *Lipids*. 1988, V. 23, P. 469–475.

12. **Gardner H. W.** Soybean lipoxygenase-1 enzymically forms both (9S)- and (13S)-hydroperoxides from linoleic acid by a pH-dependent mechanism. *Biochim. Biophys. Acta*. 1989, 1001 (3), 274–281.

13. **Berry H., Débat H., Garde V.** Oxygen concentration determines regiospecificity in soybean lipoxygenase-1 reaction via a branched kinetic scheme. *J. Biol. Chem*. 1998, 273 (5), 2769–2776.

14. **Butovich I., Reddy C.** Enzyme-catalyzed and enzyme-triggered pathways in dioxygenation of 1-monolinoleoyl-rac-glycerol by potato tuber lipoxygenase. *Biochim. Biophys. Acta (Protein Structure and Molecular Enzymology)*. 2001, 1546 (2), 379–398. [http://dx.doi.org/10.1016/S0167-4838(01)00162-5](http://dx.doi.org/10.1016/S0167-4838(01)00162-5)

15. **Andreou A.** Lipoxygenases – structure and reaction mechanism. *Phytochemistry*. 2009, 70 (14), 1504–1510. [http://dx.doi.org/10.1016/j.phytochem.2009.05.008](http://dx.doi.org/10.1016/j.phytochem.2009.05.008)

16. **Babenko L. M., Kosakivska I. V., Skaterna T. D., Kharchenko O. V.** Plant lipoxygenases in adaptation to abiotic stresses. *Biulleten Kharkivskoho Natsional. ahrar. un-tu (Ser. biol.)*. 2013, 2 (29), 6–19. (In Ukrainian).
17. Weber H., Vick B. A., Farmer E. E. Dinor-oxo-phytodienoic acid: A new hexadecanoid signal in the jasmonate family. Proc. Natl. Acad. Sci. USA. 2007. V. 94, P. 10473–10478. http://dx.doi.org/10.1073/pnas.94.19.10473

18. Grechkin A., Tarchevskiy I. Lipoxygenase signaling system. Fiziologiya rasteniy. 2000, V. 46, P. 132–142. (In Russian).

19. Feussner I., Kuhn H., Wasternack C. Lipoxygenase-dependent degradation of storage lipids. Trends Plant Sci. 2001, V. 6, P. 268–273. http://dx.doi.org/10.1016/S1360-1385(01)01950-1

20. Feussner I., Wasternack C. The lipoxygenase pathway. Ann. Rev. Plant Biol. 2002, V. 53, P. 275–297.

21. Gfeller A., Dubugnon L., Liechti R., Farmer E. Jasmonate Biochemical Pathway. Sci. Signal 3 (10), 1–622.

Buseman C. M., Tamura P., Sparks A. A., Baughman E. J., Maatta S., Zhao J., Roth M. R., Esch S. W., Shah J., Williams T. D., Welti R

. Wounding stimulates the accumulation of glycerolipids containing oxophytodienoic acid and dinor-oxophytodienoic acid in Arabidopsis leaves. Plant Physiol. 2006, V. 142, P. 28–39.

23. Turner J. G., Ellis C., Devoto A. The Jasmonate Signal Pathway. Plant Cell. 2002, V. 14, P. 5153–5164.

24. Stenzel I., Hause B., Maucher H., Pitzchke A., Miersch O., Ziegel J., Ryan C. A., Wasternack C . Allene Oxide Cyclase Dependence of the Wound Response and Vascular Bundle-Specific Generation of Jasmonates in Tomato - Amplification in Wound
Signaling.  

*Plant J.* 2003, V. 33, P. 577–589.

25. Spoel S. H., Koornneef A., Claessens S. M. C., Korzelius J. P., van Pelt J. A., Mueller M. J., Buchala A. J., Metraux J.-P., Brown R., Kazan K., van Loon L. C., Dong X., Pieterse C. M. J. NPR1 Modulates Cross-Talk between Salicylate- and Jasmonate-Dependent Defense Pathways through a Novel Function in the Cytosol.  

*Plant Cell.* 2003, V. 15, P. 760–777.

26. Gurevich A. I., Tuzova T. P., Shpak E. D., Strakova N. N., Esipov R. S. The mechanism of action of plant hormones - jasmonate. 1. Proteins - regulators of gene transcription p.pinII potato interacting with jasmonate.  

*Bioorganicheskaya khimiya.* 2000, 22 (2), 101–107. (In Russian).

27. Creelman R. A., Mullet J. E. Biosynthesis and action of jasmonates in plants.  

*Annu. Rev. Plant Phys.* 1999, V. 48, P. 355–381  

[http://dx.doi.org/10.1146/annurev.arplant.48.1.355](http://dx.doi.org/10.1146/annurev.arplant.48.1.355)

28. Mueller-Uri F., Parther B., Nover L. Jasmonate-induced alteration of gene expression in barley leaf segments analyzed by in vivo protein synthesis.  

*Planta.* 1999, V. 176, P. 241–247  

[http://dx.doi.org/10.1007/BF00392451](http://dx.doi.org/10.1007/BF00392451)

29. Vasternak K., Attsorn R., Leopold J., Herrmann G., Lehman J., Party B. Interaction of jasmonic and abscisic acid in gene expression in barley JIP (Hordeum vulgare) cv. Salona.  

*Fiziologiya rasteniy.* 1998, N 5, P. 685–695. (In Russian).

30. Hildmann T., Ebneth M., Pena-Cortes H. General roles of abscisic and jasmonic acid in gene activation as a result of mechanical wounding.  

*Plant Cell.*
31. Walker-Simmons M., Kudrna D., Warner R. Reduced accumulation of ABA during water stress in a molybdenum cofactor mutant of barley. *Plant Physiol.* 1993, V. 90, P. 28–43.

32. Hsieh H. L., Okamoto H. Molecular interaction of jasmonate and phytochrome a signaling. *J. Exp. Bot.* 2014, 65 (11), 2847–2857.

33. Ananieva K., Ananiev E. D., Mishev K., Georgieva K., Malbeck J., Kaminek M., Van Staden J. Methyl jasmonate is a more effective senescence-promoting factor in Cucurbita pepo (zucchini). *J. Plant Phys.* 2007, V. 164, P. 1179–1187.

34. Paniuta O. O., Shabliy V. A, Belawa V. N. Jasmonic acid its participation in defence reaction of plant organism. *Ukr. biochim. zh.* 2009, 81 (2), 14–26. (In Ukrainian).

35. Sanchez-Rodriguez C., Rubio-Somoza I., Sibout R., Persson S. Phytohormones and the cell wall in Arabidopsis during seedling growth. *Trends Plant Sci.* 2010, 15 (5), 291–301.

36. Bell E., Muller J. E. Characterization of an Arabidopsis Lipoxygenase Gene Responsive to Methyl Jasmonate and Wounding. *Plant Physiol.* 1993, V. 103, P. 1133–1137. 
http://dx.doi.org/10.1104/pp.103.4.1133

37. Farmer E. E., Ryan C. A. Interplant Communication – Airborne Methyljasmonate Induces Synthesis of Proteinase Inhibitors in Plant Leaves. *Proc. Natl. Acad. Sci. USA.*
1990, V. 87, P. 7713–7716.
http://dx.doi.org/10.1073/pnas.87.19.7713

38. Tarchevsky I. A. The metabolism of plants under stress. Kazan: Fen. 2001, 447 p. (In Russian).

39. Staswick P. E. J.A. Zing up Jasmonate Signaling. Trends Plant Sci. 2008, V. 13, P. 66–71.
http://dx.doi.org/10.1016/j.tplants.2007.11.011

40. Bewley J., Black M. Seed: Physiology of development and germination. N. Y.; London: Plenum Press 1985, 367 p.
http://dx.doi.org/10.1007/978-1-4615-1747-4

41. Daletskaia T., Zembdner G. Action jasmonic acid on the germination of dormant seeds and nepokoyaschihsya. Fiziologiya rasteniya. 1989, 36 (6), 118–123. (In Russian).

42. Nikolaeva M. G., Razumova M. V., Gladkova V. N. Reference book of germination of dormant seeds. Leningrad: Nauka. 1985. 348 p. (In Russian).

43. Babenko L. M. Structural-functional peculiarities of seeds with different types of dormancy. PhD. Dissertation, Dept. Elect. Ukr. Taras Shevchenko national. univ., Kyiv. 1995. (In Ukrainian).

44. Babenko L. M., Musatenko L. I. Protein synthesis in seeds of Acer tataricum L. during dormancy breaking. Russian journal of plant physiology. 1998, 45 (1), 96–100.
45. Babenko L. M., Martin G. G., Musatenko L. I. Structural-funtional peculiarities of germinationg seeds of Aesculus hippocastanum L. Dopovidi NAN Ukrainy. 2002, V. 6, P. 163–166. (In Ukrainian).

46. Golovatskaya I. F., Karnachuk R. A. Effect of jasmonic acid on the morphogenesis and the content of photosynthetic pigments in Arabidopsis seedlings on a green light. Fiziologiya rasteniy. 2008, 55 (2), 240–244. (In Russian).

47. Weidhase R., Kramell H., Lehmann J. Metiljasmonate–induced changes in the polypeptide pattern of senescing barley leaf segments. Plant Sci. 1987, V. 51, P. 177–186. http://dx.doi.org/10.1016/0168-9452(87)90191-9

48. Tanurdzic M., Banks J. A. Sex-determining mechanisms in land plants. Plant Cell. 2004, V. 16 (Suppl.), P. 61–71. http://dx.doi.org/10.1105/tpc.016667

49. Chuck G. Molecular mechanisms of sex determination in monoecious and dioecious plants. Adv. Bot. Res. 2010, V. 54, P. 53–83. http://dx.doi.org/10.1016/s0065-2296(10)54002-3

50. Ming R., Bendahmane A., Renner S. S. Sex chromosomes in land plants. Annu. Rev. Plant Biol. 2011, V. 62, P. 485–514. http://dx.doi.org/10.1146/annurev-arplant-042110-103914

51. Chailakhyan M. K., Khrianin V. N. Sexuality in plants and its hormonal regulation. N. Y.: Springer. 1987, 155 p.
52. Spigler R. B., Ashman T.-L. Sex ratio and subdioecy in Fragaria Virginians: the roles of plasticity and gene flow examined. *New Phytol.* 2011, V. 190, P. 1058–1068. http://dx.doi.org/10.1111/j.1469-8137.2011.03657.x

53. Chandler J. W. The hormonal regulation of flower development. *J. Plant Growth Regul.* 2011, V. 30, P. 242–254. http://dx.doi.org/10.1007/s00344-010-9180-x

54. Acosta I. F., Laparra H., Romero S. P., Schmelz E., Hamberg M., Mottinger J. P., Moreno M. A., Dellaporta S. L. Tasselseedl is a lipoxygenase affecting jasmonic acid signaling in sex determination of maize. *Science.* 2009, V. 323, P. 262–265. http://dx.doi.org/10.1126/science.1164645

55. Ye Q., Zhu W., Li L., Zhang S., Yin Y., Ma H., Wenig X. Brassinosteroids control male fertility by regulating the expression of key genes involved in Arabidopsis anther and pollen development. *Proc. Natl. Acad. Sci. USA* 2010, V. 07, P. 6100–6105. http://dx.doi.org/10.1073/pnas.0912333107

56. Diggle P. K., di Stilio V. S., Gschwend A. R., Golenberg E. M., Moore R. C., Russell J. R. W., Sinclair J. P. Multiple developmental processes underlie sex differentiation in angiosperms. *Trends Genet.* 2011, V. 27, P. 368–376. http://dx.doi.org/10.1016/j.tig.2011.05.003

57. Chandler J. W. The hormonal regulation of flower development. *J. Plant Growth Regul.* 2000, V. 30, P. 242–254. http://dx.doi.org/10.1007/s00344-010-9180-x
58. Boss P. K., Bastow R. M., Mylne J. S., Dean C. Multiple pathways in the decision to flower: enabling, promoting, and resetting. *Plant Cell.* 2004, V. 16, P. 18–31. [http://dx.doi.org/10.1105/tpc.015958](http://dx.doi.org/10.1105/tpc.015958)

59. Chandler J. W. Floral meristem initiation and emergence in plants. *Cell Mol. Life Sci.* 2012, V. 69, P. 3807–3818. [http://dx.doi.org/10.1007/s00018-012-0999-0](http://dx.doi.org/10.1007/s00018-012-0999-0)

60. Yu H., Ito T., Zhao Y., Peng J., Kumar P., Meyerowitz E. M. Floral homeotic genes are targets of gibberellin signaling in flower development. *Proc. Natl. Acad. Sci. USA.* 2004, V. 101, P. 7827–7832. [http://dx.doi.org/10.1073/pnas.0402377101](http://dx.doi.org/10.1073/pnas.0402377101)

61. Chandler J. Auxin as compere in plant hormone crosstalk. *Planta.* 2009, V. 231, P. 1–12. [http://dx.doi.org/10.1007/s00425-009-1036-x](http://dx.doi.org/10.1007/s00425-009-1036-x)

62. Mutasa-Gottgens E., Hedden P. Gibberellin as a factor in floral regulatory networks. *J. Exp. Bot.* 2006, V. 60, P. 1979–1989. [http://dx.doi.org/10.1093/jxb/erp040](http://dx.doi.org/10.1093/jxb/erp040)

63. Camloh M., Ravnikar M., Zel J. Jasmonic acid promotes division of fern protoplasts, elongation of rhizoids and early development of gametophytes. *Physiologia Plantarum.* 2010, 97 (4), 659–664. [http://dx.doi.org/10.1111/j.1399-3054.1996.tb00529.x](http://dx.doi.org/10.1111/j.1399-3054.1996.tb00529.x)

64. Tuteja N., Sopory S. K. Chemical signaling under abiotic stress environment in plants. *Plant Signa. Behav.* 2008, 3 (8), 525–536.
65. Karimova F. G., Tarchevskiy I. A., Mursalimova N. U. Effect of lipoxygenase products of metabolism – 12 gidoeksidodetsenovoy acid on the phosphorylation of proteins of plants. Fiziologiya rasteni y. 1999, 46 (1), 148–152. (In Russian).

66. Nishiuchi T., Hamada T., Kodama H. Wounding changes the spatial expression pattern of the Arabidopsis plastid ω-3 fatty acid desaturase gene (FAD7) through different signal transduction pathways. Plant Cell. 1997, 9 (10), 1701–1712.

67. Melan M., Dong X., Endara M. An Arabidopsis thaliana lipoxygenase gene can be induced by pathogens, abscisic acid, and methyl jasmonate. Plant Physiol. 1993, 101 (2), 441–450. http://dx.doi.org/10.1104/pp.101.2.441

68. Ben-Hayyim G., Gueta-Dahan Y., Avsian-Kretchmer O. Preferential induction of a 9-lipoxygenase by salt in salt-tolerant cells of Citrus sinensis L. Osbeck. Planta. 2001, 212 (3), 367–375. http://dx.doi.org/10.1007/s004250000397

69. Sofo A., Dichio B., Xiloyannis C. Lipoxygenase activity and proline accumulation in leaves and roots of olive trees in response to drought stress. Physiol. Plant. 2004, 121 (1), 58–65. http://dx.doi.org/10.1111/j.0031-9317.2004.00294.x

70. Hays D. B., Wilen R. W., Sheng C., Moloney M. M., Pharis R. P. Embryo-specific gene expression in microspore derived embryos of Brassica napus. An interaction between abscisic acid and jasmonic acid. Plant. Phys. 1999, 119 (3), 1065–1072. http://dx.doi.org/10.1104/pp.119.3.1065
71. Lerten N. R., Czlapinski A. R., Curtis J. D., Freckmann R. Oli bodies in mesophyll cell of angiosperms: overview and a selected survey. Am. J. Botany. 2006, 93 (12), 1731–1739. http://dx.doi.org/10.3732/ajb.93.12.1731

72. Xu L. H., Liu F. Q., Wang Z. L., Peng W., Huang R. F., Huang D. F., Xie D. X. An Arabidopsis mutant cex1 exhibits constant accumulation of jasmonate-regulated AtVSP, Thi2.1 and PDF1. EBS Lett. 2004, V. 494, P. 161–164. http://dx.doi.org/10.1016/S0014-5793(01)02331-6

73. Beckers G. J., Spoel S. H. Fine-tuning plant defence signalling: salicylate versus jasmonate. Plant Biol (Stuttg). 2006, V. 8, P. 1–10. http://dx.doi.org/10.1055/s-2005-872705

74. Anderson J. P., Badruzsaufari E., Schenk P. M., Manners J. M., Desmond O. J., Ehlert C., Maclean D. J., Ebert P. R., Kazan K. Antagonistic interaction between abscisic acid and jasmonate-ethylene signaling pathways modulates defense gene expression and disease resistance in Arabidopsis. Plant Cell. 2004, V. 16, P. 3460–3479. http://dx.doi.org/10.1105/tpc.104.025833

75. Navajas-Perez R., Herran R., Gonzalez G. L., Jamilena M., Lozano R., Rejon C. R., Rejon M. R., Garrido-Ramos M. A. The evolution of reproductive systems and sex-determining mechanisms within Rumex (Polygonaceae) inferred from nuclear and chloroplastidial sequence data. Mol. Biol. Evol. 2005, V. 22, P. 1929–1939. http://dx.doi.org/10.1093/molbev/msi186

76. Vyskot B., Araya A., Veuskens J., Negrutiu I., Mouras A. DNA methylation of sex chromosomes in a dioecious plant Melandrium album. Mol. Gen. Genet.
77. Janousek B., Siroky J., Vyskot B. Epigenetic control of sexual phenotype in a dioecious plant, Melandrium album. Mol. Gen. Genet. 1996, V. 250, P. 483–490. http://dx.doi.org/10.1007/BF02174037

78. Dellaporta S. L., Calderon-Urrea A. Sex determination in flowering plants. Plant Cell. 1993, V. 5, P. 1241–1251. http://dx.doi.org/10.1105/tpc.5.10.1241

79. Martin A., Troadec C., Boualem A., Rajab M., Fernandez R., Morin H., Pitrat M., Dogimont C., Bendahmane A. A transposon-induced epigenetic change leads to sex determination in melon. Nature. 2009, V. 461, P. 1135–1138. http://dx.doi.org/10.1038/nature08498

80. Vasjukova N. I. Ozeretskovskaya O. L. Induced resistance in plants and salicylic acids. Prikl. Biokhimiya i Mikrobiologiya. 2007, N 43, P. 405–411. (In Russian).

81. Weber H., Chetelat A., Caldelari D., Farmer E. E. Divinyl Ether Fatty Acid Synthesis in Late Blight-Diseased Potato Leave. Plant Cell. 1999, V. 11, P. 485–493. http://dx.doi.org/10.2307/3870875

82. Halim V. A., Hunger A., Macioszek V., Landgraf P., Numberger T., Scheel D., Rosahl S. The Oligopeptide Elicitor Pep-13 Induces Salicylic Acid-Dependent and -Independent Defense Reactions in Potato. Physiol. Mol. Plant Pathol. 2004, V. 64, P. 311–318. http://dx.doi.org/10.1016/j.pmpp.2004.10.003
83. Gobel C., Feussner I., Hamberg M., Rosahl S. Oxylipin Profiling in Pathogen-Infected Potato Leaves. Biochim. Biophys. Acta. 2002. V. 1584, P. 55–64. http://dx.doi.org/10.1016/S1388-1981(02)00268-8

84. Chehab E. W., Kaspi R., Savchenko T., Rowe H., Negre-Zakharov F., Kliebenstein D., Dehesh K. Distinct roles of jasmonates and aldehydes in plant defense responses. PLoS One. 2008, V. 34, P. 1904–1915. http://dx.doi.org/10.1371/journal.pone.0001904

85. Radhika V., Kost C., Bonaventure G., David A. Volatile emission in bracken fern is induced by jasmonates but not by Spodoptera littoralis or Strongylogaster multifasciata herbivore. Plant Physiol. 2012, l (151), 1130–1138.

86. Ozeretskovaia O. L., Vasiukova N. I. Chelengk G. I., Gerasimova N. G. Induction of elicitors potsesse wound repair potato tubers. Dokl. RAN. 2008, 423 (1), 129–132. (In Russian).

87. Egorov A. M., Yakovleva V. G., Tarchevskiy I. A. Comparative analysis of methyl jasmonate and salicylic acid on pea roots. Abstracts of Conf.: Cell signaling in plants. Kazan . 2011, P. 54–55. (In Russian).

88. Iris A. M., Penninckx B. P., Thomman H. J., Buchala A., Metraux J. P. Concomitant activation of jasmonate and ethylene response pathways is required for a plant defense gene in Arabidopsis. Plant Cell. 1998, V. 10, P. 2013–2113.

89. Schweizer P., Buchala A., Metraux J. P. Gene expression patterns and level of jasmonic acid in rice treated with the resistance inducer 2,6-diloroisonicotinic acid.
90. Hardham A. D., Jones D. A., Takemoto D. Cytoskeleton and Cell Wall Function in Penetration Resistance. Curr. Opin. Plant Biol. 2007, V. 10, P. 342–348. http://dx.doi.org/10.1016/j.pbi.2007.05.001

91. Qiao F., Chang X.-L., Nick P. The Cytoskeleton Enhances Gene Expression in the Response to the Harpin Elicitor in Grapevine. J. Exp. Bot. 2010, V. 61, P. 4021–4031. http://dx.doi.org/10.1093/jxb/erq221

92. Shibaoka H. Plant Hormone-Induced Changes in the Orientation of Cortical Microtubules: Alteration in the Cross-Linking between Microtubules and the Plasma Membrane. Annu. Rev. Plant Physiol. Plant Mol. Biol. 1994, V. 45, P. 527–544. http://dx.doi.org/10.1146/annurev.pp.45.060194.002523

93. Fukuda H. Programmed Cell Death of Tracheary Elements as a Paradigm in Plants. Plant Mol. Biol. 2000, V. 44, P. 245–253. http://dx.doi.org/10.1023/A:1026532223173

94. Herrera-Medina M.-J., Tamayo M.-I., Vierheilig H., Ocampo J.A., García-Garrido G.-M. The Jasmonic Acid Signalling Pathway Restricts the Development of the Arbuscular Mycorrhizal Association in Tomato. J. Plant Growth Regul. 2008, V. 27, P. 221–230. http://dx.doi.org/10.1007/s00344-008-9049-4

95. Blum J. B., Krasilenko Y. A., Emets A. I. Influence of phytohormones on the cytoskeleton of the plant cell. Fiziologiya rasteniy. 2012, 59 (4), 557–573. (In Russian).
96. **Blekhman G. I., Shelamova N. A.** Synthesis and breakdown of macromolecules under stress. *Uspekhi sovremennoy biologii.* 1992, 112 (2), 281–297. (In Russian).

97. **Ryan C. A., Pearce G.** Systemin: A Polypeptide Signal for Plant Defensive Genes. *Annu. Rev. Cell Dev. Biol.* 1998, V. 14, P. 1–17. [http://dx.doi.org/10.1146/annurev.cellbio.14.1.1](http://dx.doi.org/10.1146/annurev.cellbio.14.1.1)

98. **Li L., Li C., Lee G. I., Howe G. A.** Distinct Roles for Jasmonate Synthesis and Action in the Systemic Wound Response of Tomato. *Proc. Natl. Acad. Sci. USA* . 2002, V. 99, P. 6416–6421. [http://dx.doi.org/10.1073/pnas.072072599](http://dx.doi.org/10.1073/pnas.072072599)

99. **Hause B., Hause G., Kutter C., Miersch O., Wasternack C.** Enzymes of Jasmonate Biosynthesis Occur in Tomato Sieve Elements. *Plant Cell Physiol* . 2003, V. 44, P. 643–648. [http://dx.doi.org/10.1093/pcp/pcg072](http://dx.doi.org/10.1093/pcp/pcg072)

100. **Narvaez-Vasquez J., Ryan C. A.** The Cellular Localization of Prosystemin: A Functional Role for Phloem Parenchyma in Systemic Wound Signaling. *Planta* . 2004, V. 218, P. 360–369. [http://dx.doi.org/10.1007/s00425-003-1115-3](http://dx.doi.org/10.1007/s00425-003-1115-3)

101. **Orlans C. M., Pomerleau J., Rico R.** Vascular Architecture Generates Fine Scale Variation in Systemic Induction of Proteinase Inhibitors in Tomato. *J. Chem. Ecol* . 2000, V. 26, P. 471–485. [http://dx.doi.org/10.1023/A:1005469724427](http://dx.doi.org/10.1023/A:1005469724427)
102. Schittko U., Baldwin I. T. Constraints to Herbivore-Induced Systemic Responses: Bidirectional Signaling along Orthostichies in Nicotiana attenuate. J. Chem. Ecol. 2003, V. 29, P. 763–770. http://dx.doi.org/10.1023/A:1022833022672

103. Ryan C. A. The Systemin Signaling Pathway: Differential Activation of Plant Defensive Genes. Biochim. Biophys. Acta. 2000, V. 1477, P. 112–121. http://dx.doi.org/10.1016/S0167-4838(99)00269-1

104. Zhao Y., Bender C. L., Schaller A., He S. Y., Howe G. A. Virulence Systems of Pseudomonas syringae pv. Tomato Promote Bacterial Speck Disease in Tomato by Targeting the Jasmonate Signaling Pathway. Plant J. 2003, V. 36, P. 485–499. http://dx.doi.org/10.1046/j.1365-313X.2003.01895.x

105. Howe G. A., Lee G. I., Itoh A., Li L., De Rocher A. E. Cytochrom P450-Dependent Metabolism of Oxylipins in Tomato. Cloning and Expression of Allene Oxide Synthase and Fatty Acid Hydroperoxide Lyase. Plant Physiol. 2000, V. 123, P. 711–724. http://dx.doi.org/10.1104/pp.123.2.711

106. Nelson C. E., Walkersimmons M., Makus D., Zuroska G., Graham J., Ryan C. A. Regulation of Synthesis and Accumulation of Proteinase-Inhibitors in Leaves of Wounded Tomato Plants. ACS Symp. Ser. 1983, V. 208, P. 103–122.

107. Zhang Z. P., Baldwin I. T. Transport of [2-C-14] Jasmonic Acid from Leaves to Roots Mimics Wound-Induced Changes in Endogenous Jasmonic Acid Pools in Nicotiana sylvestris. Planta. 1997, V. 203, P. 436–441.

108. Farmer E. E., Jonhson R. R., Ryan C. A. Regulation of Expression of
Proteinase-Inhibitor Genes by Methyljasmonate and Jasmonic Acid.

*Plant Physiol.*
1992, V. 98, P. 995–1002.

109. *Lapa S. V., Kovbasenko R. V., Kovbasenko V. M., Dmitriev O. P.* Jasmonic acid: functions and mechanisms of action in plants.

*Kyiv: Kolobig*.
. 2012, 80 p. (In Russian).

110. *Lugovaya A. A., Karpets Yu. V., Oboznyi A. I., Kolupaev Yu. E.* Stress-protective effect of jasmonic and succinic acids on barley plants under soil drought condition.

*Agrokhimiya*.
. 2014, N 4, P. 48–55. (In Russian).

111. *Ozeretskovaia O. L., Vasiukova N. I., Chelengk G. I., Gerasimova N. G.* Wound repair and induced resistance of potato tubers.

*Prikl. biokhim. i mikrobiol.*
2009, 45 (20), 220–224. (In Russian).

112. *Vayner A. A., Lugovaya A. A., Kolupaev Yu. E., Miroshnichenko N. N.* The influence of jasmonic acid on productivity and resistance of millet plant to unfavorable abiotic factors.

*Agrokhimiya*.
. 2014, N 4, P. 68–73. (In Russian).

113. *Yarullina L. G., Troshina N. B., Cherepanov E. A., Zaikina E. A.* Salicylic and jasmonic kisloti in the regulation about the antioxidant status when infected leaves pshenitsi Septoria nodorum Berk.

*Prikl. biokhim. i mikrobiol*.
. 2011, 47 (50), 602–608. (In Russian).

114. *Gundlach H., Muller M. J., Kutchan T. M., Zenk M. H.* Jasmonic acid is a signal transducer in elicitor-induced plant cell cultures.

*Proc. Natl. Acad. Sci. USA*.
. 1992, V. 89, P. 2389–239.
115. Sindarovska Y. R., Gerasymenko I. M., Kuchuk M. V. Influence of exogenous phytohormones, methyjasmonate and suppressors of jasmonatebiosynthesis on Agtransient expression in Nicotiana excelsior. *Biopolimer and cell*. 2012, 28 (5), 386–375.

1. Demole E., Lederer E., Mercier D. Isolement et détermination de la structure dujasmonate de méthyle, constituant odorant charactéristique de l'essence de jasmine. *Helvet. Chim. Acta*. 1962, V. 4, P. 675–685.

2. Vick B., Zimmerman D. The biosynthesis of jasmonic acid: a physiological role for plant lipoxigenases. *BBRC*. 1986, 111 (2), 470–477.

3. Parthier B. Jasmonates: hormonal regulators or stress factors in leaf senescence? *J. Plant Growth Regul*. 1993, V. 9, P. 57–63.

4. Sembdner G., Parthier B. The biochemistry and the physiological and molecular actions of jasmonates. *Ann. Rev. Plant Physiol*. 1993, V. 44, P. 569–589.

5. Wasternack C. Jasmonates: an update on biosynthesis, signal transduction and action in
plant stress response, growth and development. *Ann. Bot.* 2007, V. 100, P. 6

6. Wasternack C., Forner S., Strnad M., Hause B. Jasmonates in flower and seed development. *Biochimie.* 2013, V. 5, P. 79–85.

7. Turner J. G., Ellis C., Devoto A. The Jasmonate Signal Pathway. *The Plant Cell.* 2002, V. 14, P. 153–164.

8. Zalewski K., Nitkiewicz B., Lahuta L. B., Glowacka K., Socha A., Amarowicz R. Effect of jasmonic acid-methyl ester on the composition of carbohydrates and germination of yellow lupine (*Lupinus luteus* L.) seeds. *J. Plant Phys.* 2010, V. 167, P. 967–973.
9. Hause B., Wasternack C., Strack D. Jasmonates in stress responses and development. *Phytochemistry* . 2009, V. 70, P. 1483–1484.

10. Tarchevskiy I. A. Elicitors – induced signaling systems and their interaction. *Fiziologiiia rasteniy* . 2000, V. 47, P. 321–331. (In Russian).

11. Hamberg M., Hughes M. A. Fatty acid allene oxides. III. Albumin-induced cyclization of 12,13(S)-epoxy-9(Z), 11-octadecadienoic acid. *Lipids*. 1988, V. 23, P. 469–475.

12. Gardner H. W. Soybean lipoxygenase-1 enzymically forms both (9S)- and (13S)-hydroperoxides from linoleic acid by a pH-dependent mechanism. *Biochim. Biophys. Acta* . 1989, 1001 (3),
274–281.

13. Berry H., Débat H., Garde V. Oxygen concentration determines regiospecificity in soybean lipoxygenase-1 reaction via a branched kinetic scheme. J. Biol. Chem. 1998, 273 (5), 2769–2776.

14. Butovich I., Reddy C. Enzyme-catalyzed and enzyme-triggered pathways in dioxygenation of 1-monolinoleoyl-rac-glycerol by potato tuber lipoxygenase. Biochim. Biophys. Acta (Protein Structure and Molecular Enzymology). 2001, 1546 (2), 379–398.

15. Andreou A. Lipoxygenases – structure and reaction mechanism. Phytochemistry. 2009, 70 (14), 1504–1510.

16. Babenko L. M., Kosakivska I. V., Skaterna T. D., Kharchenko O. V. Plant lipoxygenases in adaptation to abiotic stresses. Biulleten Kharkivskoho Natsional. ahrar. un-tu (Ser. biology). 2013, 2 (29), 6–19. (In Ukrainian).
17. Weber H., Vick B. A., Farmer E. E. Dinor-oxo-phytadienoic acid: A new hexadecanoid signal in the jasmonate family. Proc. Natl. Acad. Sci. USA. 2007. V. 94, P. 10473–10478.

18. Grechkin A., Tarchevskiy I. Lipoxygenase signaling system. Fiziologija rasteni. 2000, V. 46, P. 132–142. (In Russian).

19. Feussner I., Kuhn H., Wasternack C. Lipoxygenase-dependent degradation of storage lipids. Trends Plant Sci. 2001, V. 6, P. 268–273.

20. Feussner I., Wasternack C. The lipoxygenase pathway. Ann. Rev. Plant Biol. 2002, V. 53, P. 275–297.

21. Gfeller A., Dubugnon L., Liechti R., Farmer E. Jasmonate Biochemical Pathway. Sci. Signal. 3 (10), 1–6.

22. Buseman C. M., Tamura P., Sparks A. A., Baughman E. J., Maatta S., Zhao J., Roth M. R., Esch S., Shah J., Williams T. W., Welti R. Wounding stimulates the accumulation of glycerolipids containing oxophytodienoic acid and dinor-oxophytadienoic acid.
in Arabidopsis leaves.  
*Plant Physiol.* 2006, V. 142, P. 28–39.

23. Turner J. G., Ellis C., Devoto A. The Jasmonate Signal Pathway. *Plant Cell.* 2002, V. 14, P. 5153–5164.

24. Stenzel I., Hause B., Maucher H., Pitzchke A., Miersch O., Ziegel J., Ryari C. A., Wastermack C. Allene Oxide Cyclase Dependence of the Wound Response and Vascular Bundle-Specific Generation of Jasmonates in Tomato - Amplification in Wound Signaling. *Plant J.* 2003, V. 33, P. 577–589.

25. Spoel S. H., Koornneef A., Claessens S. M. C., Korzelius J. P., van Pelt J. A., Mueller M. J., Buchala A. J., Metraux J. P., Brown
R
Kazanjian
van Loon
C
Dong X
Pieterse C
M J
NPR 1
Modulates Cross Talk between Salicylate and Jasmonate Dependent Defense Pathways through a Novel Function in the Cytosol.

Plant Cell
2003, V. 15, P. 760–777.

26. Gurevich A. I., Tuzova T. P., Shpak E. D., Strakova N. N., Esipov R. S. The mechanism of action of plant hormones - jasmonate. 1. Proteins - regulators of gene transcription p.pinII potato interacting with jasmonate.

*Bioorganicheskaia chimia* . 2000, 22 (2), 101–107. (In Russian)

27. Creelman R. A., Mullet J. E. Biosynthesis and action of jasmonates in plants. *Annu. Rev. Plant Phys* . 1999, V. 48, P. 355–381.

28. Mueller-Uri F., Parthier B., Nover L. Jasmonate-induced alteration of gene expression in barley leaf segments analyzed by in
vivo protein synthesis.

*Planta*

1999, V

176, P.

241 – 247.

29. Vasternak K., Attson R., Leopold J., Herrmann G., Lehman J., Party B. Interaction of jasmonic and abscisic acid in gene expression in barley JIP (Hordeum vulgare) cv. Salona. *Physziologia rastenii*. 1998, N 5, P. 685 – 695. (In Russian).

30. Hildmann T., Ebneth M., Pena-Cortes H. General roles of abscisic and jasmonic acid in gene activation as a result of mechanical wounding. *Plant*
31. Walker-Simmons M., Kudrna D., Warner R. Reduced accumulation of ABA during water stress in a molybdenum cofactor mutant of barley.

Plant Physiol.
1993
V. 90
P. 28
– 43.

32. Hsieh H. L., Okamoto H. Molecular interaction of jasmonate and phytochrome a signalin

J. Exp. Bot.
2014, 65 (11), 284
7
– 285
7.
33. Ananieva K., Ananiev E. D., Mishev K., Georgieva K., Malbeck J., Kaminek M., Van Staden J. Methyljasmonate is a more effective senescence-promoting factor in Cucurbita pepo (zucchini). J. Plant Phys. 2007, V. 164, P. 1179—1187.

34. Paniuta O. O., Shablіy V. A, Belawa V. N. Jasmonic acid its participatio in defence reactio of plant organism. Ukr. biochim. zh. 2009, 81 (2), 14—26. (In Ukrainian).
35. Sanchez-Rodriguez C., Rubio-Somoza I., Sibout R., Persson S. Phytohormones and the cell wall in Arabidopsis during seedling growth. *Trends Plant Sci*. 2010, 15(5), 291–301.

36. Bell E., Muller J. E. Characterization of an Arabidopsis Lipoxygenase Gene Responsive to Methyl Jasmonate and Wounding. *Plant Physiol.* 1993, V. 103, P. 1133–1137.

37. Farmer E. E., Ryan C. A. Interplant Communication – Airborne Methyljasmonate Induces Synthesis of Proteinase Inhibitors in Plant Leaves. *Proc. Natl. Acad. Sci. USA*. 1990, V. 87, P. 7713–7716.

38. Tarchevsky I. A. The metabolism of plants under stress. *Kazan: Fen*. 2001, 447 p. (In Ru
ssian).

39. Staswick P. E. JAzing up Jasmonate Signaling. *Trends Plant Sci.* 2008, V. 13, P. 66–71.

40. Bewley J., Black M. Seed: Physiology of development and germination. *N. Y.; London: Plenum Press*. 1985, 367 p.

41. Daletskaia T., Zembdner G. Action jasmonic acid on the germination of dormant seeds and nepokoyaschihsya. *Fiziologiiia rastenii*. 1989, 36 (6), 118–123. (In Russian).

42. Nikolaeva M. G., Razumova M. V., Gladkova V. N. Reference book of germination of dormant seeds. *Leningrad: Nauka*. 1985. 348 p. (In Russian).

43. Babenko L. M. Structural-functional peculiarities of seeds with different types of dormancy. PhD. Dissertation, Dept. Elect. Ukr. *Tarasa Shevchenka univ., Kyiv*. 
1995.  
(In Ukrainian).

44. Babenko L. M., Musatenko L. I. Protein synthesis in seeds of Acer tataricum L. during dormancy breaking.  
*Russian journal of plant physiology.*  
1998, 45 (1), 96–100.

45. Babenko, L. M., Martin G. G., Musatenko L. I. Structural-funtional peculiarities of germinationg seeds of Aesculus hippocastanum L.  
*Dopovidi NAN Ukrainy.*  
2002, V. 6, P. 163–166.  
(In Ukraine).

46. Golovatskaya I. F., Karnachuk R. A. Effect of jasmonic acid on the morphogenesis and the content of photosynthetic pigments in Arabidopsis seedlings on a green light.  
*Fiziologiiia rastenii.*  
2008, 55 (2...
47. Weidhase R., Kramell H., Lehmann J. Metiljasmonate–induced changes in the polypeptide pattern of senescing barley leaf segments. *Plant Sci.* 1987, V. 51, P. 177–186.

48. Tanurdzic M., Banks J. A. Sex-determining mechanisms in land plants. *Plant Cell.* 2004, V. 16 (Suppl.), P. 61–71.

49. Chuck G. Molecular mechanisms of sex determination in monoecious and dioecious plants. *Adv. Bot. Res.* 2010, V. 54, P. 53–83.

50. Ming R., Bendahmane A., Renner S. S. Sex chromosomes in land plants. *Annu. Rev. Plant Biol.* 2011, V. 62, P. 485–514.

51. Chailakhyan M. K., Khrianin V. N. Sexuality in plants and its hormonal regulation. *N. Y.: Springer.*
1987, 155 p.

52. Spigler R. B., Ashman T.-L. Sex ratio and subdioecy in Fragaria Virginians: the roles of plasticity and gene flow examined. *New Phytol.* 2011, V. 190, P. 1058–1068.

53. Chandler J. W. The hormonal regulation of flower development. *J. Plant Growth Regul.* 2011, V. 30, P. 242–254.

54. Acosta I. F., Laparra H., Romero S. P., Schmelz E., Hamberg M., Mottinger J. P., Moreno M. A., Dellaporta S. L. Tasselseedl is a lipoxygenase affecting jasmonic acid signaling in sex determination of maize. *Science.* 2009, V. 323, P. 262–265.

55. Ye Q., Zhu W., Li L., Zhang S., Yin Y., Ma H., Wenig X. Brassinosteroids control male fertility by regulating the expression of key genes involved in Arabidopsis anther and pollen development. *Proc. Natl. Acad. Sci. USA.* 2010, V. 07, P. 6100–6105.

56. Diggle P. K., di Stilio V. S., Gschwend A. R., Golenberg E. M., Moore R. C., Russell J. R. W., Sinclair J. P. Multiple developmental processes underlie sex differentiation in angiosperms. *Trends Genet.* 2011, V. 27, P. 368–376.

57. Chandler J. W. The hormonal regulation of flower development. *J. Plant Growth Regul.* 2000, V. 30, P. 242–254.

58. Boss P. K., Bastow R. M., Mylne J. S., Dean C. Multiple pathways in the decision to flower: enabling, promoting, and resetting. *Plant*
59. Chandler J. W. Floral meristem initiation and emergence in plants. *Cell Mol. Life Sci.* 2012, V. 69, P. 3807–3818.

60. Yu H., Ito T., Zhao Y., Peng J., Kumar P., Meyerowitz E. M. Floral homeotic genes are targets of gibberellin signaling in flower development. *Proc. Natl. Acad. Sci. USA.* 2004, V. 101, P. 7827–7832.

61. Chandler J. Auxin as compere in plant hormone crosstalk. *Planta.* 2009, V. 231, P. 1–12.

62. Mutasa-Gottgens E., Hedden P. Gibberellin as a factor in floral regulatory networks. *J. Exp. Bot.* 2006, V. 60, P. 1979–1989.

63. Camloh M., Ravnikar M., Zel J. Jasmonic acid promotes division of fern protoplasts, elongation of rhizoids and early development of gametophytes. *Physiologia Plantarum.* 2010, 97 (4), 659–664.

64. Tuteja N., Sopory S. K. Chemical signaling under abiotic stress environment in plants. *Plant Signa. Behav.* 2008, 3 (8), 525
65. Karimova F. G., Tarchevskiy I. A., Mursalimova N. U. Effect of lipoxygenase products of metabolism — 12 gidroksidodetsenovoy acid on the phosphorylation of proteins of plants. *Fiziologiia rastenii*. 1999, 46 (1), 148

66. Nishiuchi T., Hamada T., Kodama H. Wounding changes the spatial expression pattern of the Arabidopsis plastid ω-3 fatty acid desaturase gene (FAD7) through different signal transduction pathways. *Plant Cell*. 1997, 9 (10), 1701–1712.

67. Melan M., Dong X., Endara M. An Arabidopsis thaliana lipoxygenase gene can be induced by pathogens, abscisic acid, and methyl jasmonate. *Plant Physiol.* 1993, 101 (2), 441–450.

68. Ben-Hayyim G., Gueta-Dahan Y., Avsian-Kretchmer O. Preferential induction of a 9-lipoxygenase by salt in salt-tolerant cells of Citrus sinensis L. Osbeck. *Planta*. 2001, 212 (3), 367–375.

69. Sofo A., Dichio B., Xiloyannis C. Lipoxygenase activity and proline accumulation in leaves and roots of olive trees in response to drought stress. *Physiol. Plant*. 2004, 121 (1), 58–65.

70. Hays D. B., Wilen R. W., Sheng C., Moloney M. M., Pharis R. P. Embryo-specific gene expression in microspore derived embryos of Brassica napus. An interaction between abscisic
71. Lerten N. R., Czlapinski A. R., Curtis J. D., Freckmann R. Oli bodies in mesophyll cell of angiosperms: overview and a selected survey. *Am. J. Botany*. 2006, 93 (12), 1731–1739.

72. Xu L. H., Liu F. Q., Wang Z. L., Peng W., Huang R. F., Huang D. F., Xie D. X. An *Arabidopsis* mutant *cex*1 exhibits constant accumulation of jasmonate-regulated AtVSP, Thi2.1 and PDF1. *FEBS Lett*. 2004, V. 494, P. 161–164.

73. Beckers G. J., Spoel S. H. Fine-tuning plant defence signalling: salicylate versus jasmonate. *Plant Biol (Stuttg)*. 2006, V. 8, P. 1–10.
74. Anderson J. P., Badruzsaufari E., Schenk P. M., Manners J. M., Desmond O. J., Ehlert C., Maclean D. J., Ebert P. R., Kazan K. Antagonistic interaction between abscisic acid and jasmonate-ethylene signaling pathways modulates defense gene expression and disease resistance in Arabidopsis. *Plant Cell*. 2004, V. 16, P. 3460–3479.

75. Navajas-Perez R., Herran R., Gonzalez G. L., Jamilena M., Lozano R., Rejon C. R., Rejon M. R., Garrido-Ramos M. A. The evolution of reproductive systems and sex-determining mechanisms within *Rumex* (Polygonaceae) inferred from nuclear and chloroplastidial sequence data. *Mol. Biol. Evol.* 2005, V. 22, P. 1929–1939.

76. Vyskot B., Araya A., Veuskens J., Negrutiu I., Mouras A. DNA methylation of sex chromosomes in a dioecious plant Melandrium album. *Mol. Gen. Genet*. 1993, V. 239, P. 219–224.

77. Janousek B., Siroky J., Vyskot B. Epigenetic control of sexual phenotype in a dioecious plant, Melandrium album. *Mol. Gen. Genet*. 1996, V. 250, P. 483–490.

78. Dellaporta S. L., Calderon-Urrea A. Sex determination in flowering plants. *Plant Cell*. 1993, V. 5, P. 1241–1251.

79. Martin A., Troade C., Boualem A., Rajab M., Fernandez R., Morin H., Pitrat M., Dogimont C., Bendahmane A. A transposon-induced epigenetic change leads to sex determination in melon. *Nature*. 2009, V. 461, P. 1135–1138.

80. Vasjukova N. I. Ozeretskovskaya O. L. Induced resistance in plants and salicylic acids. *Prikl. Biochimiya i Microbiologiya*. .
81. Weber H., Chetelat A., Candelari D., Farmer E. E. Divinyl Ether Fatty Acid Synthesis in Late
Blight-Diseased Potato Leave. *Plant Cell*. 1999, V. 11, P. 485–493.

82. Halim V. A., Hunger A., Macioszek V., Landgraf P., Nurnberger T., Scheel D., Rosahl S. Th
e Oligopeptide Elicitor Pep-13 Induces Salicylic Acid-Dependent and -Independent Defense
Reactions in Potato. *Physiol. Mol. Plant Pathol*. 2004, V. 64, P. 311–318.

83. Gobel C., Feussner I., Hamberg M., Rosahl S. Oxylin Profiling in Pathogen-Infected
Potato Leaves. *Biochim. Biophys. Acta*. 2002. V. 1584, P. 55–64.

84. Chehab E. W., Kaspi R., Savchenko T., Rowe H., Negre-Zakharov F., Kliebenstein D.,
Dehesh K. Distinct roles of jasmonates and aldehydes in plantdefense responses. *PLoS
One*. 2008, V. 34, P. 1904–1915.

85. Radhika V., Kost C., Bonaventure G., David A. Volatile emission in bracken fern is induced
by jasmonates but not by herbivores. *Spodoptera littoralis* or *Strongylogaster multifasciata*
herbivore. *Plant Physio*. 2012, 1 (151), 1130–1138.

86. Ozeretskova O. L., Vasiukova N. I. Chelengk G. I., Gerasimova N. G. Induction of
elicitors potsesse wound repair potato tubers

. Dokl.
RAN
.
2008
,
423
(
1
),
129–132
. (In
Russian).

87. Egorov A. M., Yakovleva V. G., Tarchevskiy I. A. Comparative analysis of methyl jasmonate and salicylic acid on pea roots . Abstracts of Conf.: Cell signaling in plants. Kazan
.
2011
,
P.
54–55.
(In
Russian).

88. Iris A. M., Penninckx B. P., Thomman H. J., Buchala A., Metraux J. P. Concomitantly activation of jasmonate and ethylene response pathways is required for a plant defense gene in Arabidopsis. Plant Cell.
1998, V. 10, P. 2013 – 2113.

89. Schweizer P., Buchala A., Metraux J. P. Gene expression patterns and level of jasmonic acid in rice treated with the resistance inducer 2,6-diloroisonicotinic acid. Plant Physiol.
1997, V. 115, P. 61 –
90. Hardham A. D., Jones D. A., Takemoto D. Cytoskeleton and Cell Wall Function in Penetration Resistance. *Curr. Opin. Plant Biol.* 2007, V. 10, P. 342–348.

91. Qiao F., Chang X.-L., Nick P. The Cytoskeleton Enhances Gene Expression in the Response to the Harpin Elicitor in Grapevine. *J. Exp. Bot.* 2010, V. 61, P. 4021–4031.

92. Shibaoka H. Plant Hormone-Induced Changes in the Orientation of Cortical Microtubules: Alteration in the Cross-Linking between Microtubules and the Plasma Membrane. *Annu. Rev. Plant Physiol. Plant Mol. Biol.* 1994, V. 45, P. 527–544.

93. Fukuda H. Programmed Cell Death of Tracheary Elements as a Paradigm in Plants. *Plant Mol. Biol.* 2000, V. 44, P. 245–253.

94. Herrera-Medina M.-J., Tamayo M.-I., Vierheilig H., Ocampo J.A., García-Garrido G.-M. The Jasmonic Acid Signalling Pathway Restricts the Development of the Arbuscular Mycorrhizal Association in Tomato. *J. Plant Growth Regul.* 2008, V. 27, P. 221–230.

95. Blum J. B., Krasilenko Y. A., Emets A. I. Influence of phytohormones on the cytoskeleton of the plant cell. *Fiziologiia rastenii.* 2012, 59 (4), 557–573. (In Russian)

96. Blekhman G. I., Shelamova N. A. Synthesis and breakdown of macromolecules under stress *Uspekhi sovremennoi biologii.* 1992, 112 (2), 28
97. Ryan C. A., Pearce G. Systemin: A Polypeptide Signal for Plant Defensive Genes. *Annu. Rev. Cell Dev. Biol*. 1998, V. 14, P. 1–17.

98. Li L., Li C., Lee G. I., Howe G. A. Distinct Roles for Jasmonate Synthesis and Action in the Systemic Wound Response of Tomato. *Proc. Natl. Acad. Sci. USA*. 2002, V. 99, P. 6416–6421.

99. Hause B., Hause G., Kutter C., Miersch O., Wasternack C. Enzymes of Jasmonate Biosynthesis Occur in Tomato Sieve Elements. *Plant Cell Physiol*. 2003, V. 44, P. 643–648.

100. Narvaez-Vasquez J., Ryan C. A. The Cellular Localization of Prosystemin: A Functional Role for Phloem Parenchyma in Systemic Wound Signaling. *Planta*. 2004, V. 218, P. 360–369.

101. Orlans C. M., Pomerleau J., Ricco R. Vascular Architecture Generates Fine Scale Variation in Systemic Induction of Proteinase Inhibitors in Tomato. *J. Chem. Ecol*. 2000, V. 26, P. 471–485.

102. Schittko U., Baldwin I. T. Constraints to Herbivore-Induced Systemic Responses: Bidirectional Signaling along Orthostichies in Nicotiana attenuate. *J. Chem. Ecol*. 2003, V. 29, P. 763–770.
103. Ryan C. A. The Systemin Signaling Pathway: Differential Activation of Plant Defensive Genes. *Biochim. Biophys. Acta.* 2000, V. 1477, P. 112–121.

104. Zhao Y., Bender C. L., Schaller A., He S. Y., Howe G. A. Virulence Systems of Pseudomonas syringae pv. Tomato Promote Bacterial Speck Disease in Tomato by Targeting the Jasmonate Signaling Pathway. *Plant J.* 2003, V. 36, P. 485–499.

105. Howe G. A., Lee G. I., Itoh A., Li L., De Rocher A. E. Cytochrom P450-Dependent Metabolism of Oxytropins in Tomato. Cloning and Expression of Allene Oxide Synthase and Fatty Acid Hydroperoxide Lyase. *Plant Physiol.* 2000, V. 123, P. 711–724.

106. Nelson C. E., Walkersimmons M., Makus D., Zuroska G., Graham J., Ryan C. A. Regulation of Synthesis and Accumulation of Proteinase-Inhibitors in Leaves of Wounded Tomato Plants. *ACS Symp. Ser.* 1983, V. 208, P. 103–122.

107. Zhang Z. P., Baldwin I. T. Transport of [2-C-14] Jasmonic Acid from Leaves to Roots Mimics Wound-Induced Changes in Endogenous Jasmonic Acid Pools in Nicotiana sylvestris. *Planta.* 1997, V. 203, P. 436–441.

108. Farmer E. E., Johnson R. R., Ryan C. A. Regulation of Expression of Proteinase-Inhibitor Genes by Methyljasmonate and Jasmonic Acid. *Plant Physiol.* 1992, V. 98, P. 995–1002.

109. Lapa S. V., Kovbasenko R. V., Kovbasenko V. M., Dmitriev O. P. Jasmonic acid: functions and mechanisms of action in plants. *Kyiv: Kolobig.*
110. Lugovaya A. A., Karpets Yu. V., Oboznyi A. I., Kolupaev Yu. E. Stress-protective effect of jasmonic and succinic acids on barley plants under soil drought condition. 
*Agrokhimiia* 
2014, N 4, P. 48–55. 
(In Russian).

111. Ozeretskovaia O. L., Vasiukova N. I., Chelengk G. I. Gerasimova N. G. Wound repair and induced resistance of potato tubers. 
*Prikl. biochim. i mikrobiol* 
2009, 45 (20), 220–224. 
(In Russian).

112. Vayner A. A., Lugovaya A. A., Kolupaev Yu. E., Miroshnichenko N. N. The influence of jasmonic acid on productivity and resistance of millet plant to unfavorable abiotic factors. 
*Agrokhimiia* 
2014, N 4, P. 68–73. 
(In Russian).

113. Yarullina L. G., Troshina N. B., Cherepanov E. A, Zaikina E. A. Salicylic and jasmonic kisloti in the regulation about the antioxidant status when infected leaves pshenitsi Septoria nodorum Berk.
114. Gundlach H., Muller M. J., Kutchan T. M., Zenk M. H. Jasmonic acid is a signal transducer in elicitor-induced plant cell cultures. *Proc. Natl. Acad. Sci. USA.* 1992, V. 89, P. 2389–239.

115. Sindarovska Y. R., Gerasymenko I. M., Kuchuk M. V. Influence of exogenous phytohormones, methyjasmonate and suppressors of jasmonatebiosynthesis on Agtransient expression in Nicotiana excelsior. *Biopolimer and cell.* 2012, 28 (5), 386–375.