

# Curriculum Vitae

## Personal information

First name(s) / Surname(s) **Eugenio BENVENUTO**

Address(es) Work: ENEA, Research Center Casaccia, Via Anguillarese, 301. I-00123, Roma, Italy

Telephone(s) Mobile:

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Nationality Italian

Date of birth

Gender Male

## Work experience

March 2022 to date **Senior Scientist, Laboratory of Biotechnology, Senior Advisor at ENEA**, Biotechnology and Agroindustry Division, Casaccia Research Center, Roma, Italy

2010 to March 2022 **Senior Scientist, Laboratory of Biotechnology Head at ENEA**, Biotechnology and Agroindustry Division Formerly at Technical Unit Radiation Biology and Human Health Casaccia Research Center, Roma, Italy.

2001-2010 **Senior Scientist, Plant Genetics and Genomics Section Head** at ENEA, Biotechnology Department, Casaccia Research Center, Roma, Italy.

1990-2001 **Senior Scientist, Group Leader at ENEA**, Biochemistry and Molecular Biology Laboratory, Casaccia Research Center, Roma, Italy.

1983-1990 **Scientist Permanent Staff at ENEA**, Genetic Engineering Group, Agro-industrial Department, Casaccia Research Center, Roma, Italy.  
-1986- Visiting scientist at Purdue University Department of Biological Sciences USA.

## Education and training

1980 -1983 Fellowships in Plant Genetics at Vegetable Crops Institute (Italian Ministry of Agriculture); ENEA; John Innes Institute (UK).

1977 '*Laurea*' in Biological Sciences (110 /110 cum laude) at the University of Rome 'La Sapienza' (Genetics).

## Personal skills and competences

Mother tongue(s) Italian Other

language(s) English

Self-assessment

European level (\*)

Language

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C1	Proficient user	C2	Proficient user	C1	Proficient user	B2	Proficient user	C2	Proficient user

Social skills and competences Good relationship and communication skills

Organisational skills and competences

- Excellent organization skills (Head of Laboratory with dozens of people in staff)
- Excellent networking skills
- Coordination and management of research projects
- Team working experience at international level

Technical skills and competences

Thirty years experience in **Genetics** and **Molecular Biology**.

Fields of interest:

- **Agrobacterium-mediated Plant Gene Transfer**; early publications on transgenic potato and *Nicotiana benthamiana*.
- **Plant virology**; early publications on plant viral genomes organization.
- **Antibody engineering and intracellular immunization**; early publications on antibody engineering (recombinant antibodies).
- **Antibody-mediated Plant Protection**; First demonstration of plant protected from virus attack by foreign expression of antibodies.
- **Molecular farming: production of antibodies and antigens in plants**; Overproduction of therapeutic antibodies in plant at high efficiency and fundamental basic discovery of display of immunogenic relevant epitopes on plant virus coat proteins.
- **Proteomics**; Research on effects of: transgene expression in plants, viral infections. Post-harvest Systems Biology of grape. Search of protein biomarkers in malignancies.
- **Indoor smart Agriculture**; Novel Methods of plant farming in soilless conditions and extreme environments

Many indexed publications. **H index 32** (as of Google Scholar).

Co-authorship in International Patents.

Computer skills and competences Normal User

Other skills and competences **Associated Editor of Plant Cell Reports (Springer).**

**Permanent Member of the Scientific Board of the PhD Programme in Animal and Plant Productivity at Università della Tuscia, Viterbo;**

Formerly Member of the Scientific Board of the:

1. PhD Programme In Plant Biotechnology at Università della Tuscia, Viterbo;
2. PhD Programme in Agro-Biodiversity at Scuola Superiore S. Anna, Pisa.

## Publications Eugenio Benvenuto

- 1: Pagliarello R, Bennici E, Cemmi A, Di Sarcina I, Spelt C, Nardi L, Del Fiore A, De Rossi P, Paolini F, Koes R, Quattrocchio F, Benvenuto E and Massa S. (2023). Designing a novel tomato ideotype for future cultivation in space manned missions. *Front. Astron. Space Sci.* 9:1040633. doi: 10.3389/fspas.2022.1040633
- 2: Metelli G, Lampazzi E, Pagliarello R, Garegnani M, Nardi L, Calvitti M, Gugliermetti L, Restivo Alessi R, Benvenuto E, Desiderio A. Design of a modular controlled unit for the study of bioprocesses: Towards solutions for Bioregenerative Life Support Systems in space. *Life Sci Space Res (Amst)*. 2023 Feb; 36:8-17. doi: 10.1016/j.lssr.2022.10.006. Epub 2022 Oct 28. PMID: 36682833.
- 3: Nardi L, Metelli G, Garegnani M, Villani ME, Massa S, Bennici E, Lamanna R, Catellani M, Bisti S, Maggi MA, De Murtas OC, Benvenuto E, Desiderio A. Farming for Pharming: Novel Hydroponic Process in Contained Environment for Efficient Pharma-Grade Production of Saffron. *Molecules* 2022, 27, 8972. doi.org/10.3390/molecules27248972
- 4: De Martinis D, Hitzeroth II, Matsuda R, Soto Pérez N, Benvenuto E. Editorial: Engineering the Plant Biofactory for the Production of Biologics and Small-Molecule Medicines-Volume 2. *Front Plant Sci.* 2022 Jul 7;13:942746. doi:10.3389/fpls.2022.942746. PMID: 35873996; PMCID: PMC9301360.
- 5: Buyel JF, Benvenuto E, Meyers AE. Editorial: Proceedings of the 4th biennial conference of the International Society for Plant Molecular Farming. *Front Bioeng Biotechnol.* 2022 Oct 5;10:1023227. doi: 10.3389/fbioe.2022.1023227. PMID:36277374; PMCID: PMC9581266.
- 6: Massa S, Pagliarello R, Cemmi A, Di Sarcina I, Bombarely A, Demurtas OC, Diretto G, Paolini F, Petzold HE, Bliet M, Bennici E, Del Fiore A, De Rossi P, Spelt C, Koes R, Quattrocchio F, Benvenuto E. Modifying Anthocyanins Biosynthesis in Tomato Hairy Roots: A Test Bed for Plant Resistance to Ionizing Radiation and Antioxidant Properties in Space. *Front Plant Sci.* 2022 Feb 24;13:830931. doi: 10.3389/fpls.2022.830931. PMID: 35283922; PMCID: PMC8909381.
- 7: De Martinis D, Rybicki EP, Colonna N, Benvenuto E, Llorente B. Editorial: Next Generation Agriculture: Understanding Plant Life for Food, Health and Energy. *Front Plant Sci.* 2020 Aug 12;11:1238. doi: 10.3389/fpls.2020.01238. PMID: 32903412; PMCID: PMC7434929.
- 8: Desiderio A, Salzano AM, Scalon A, Massa S, Pimpinella M, De Coste V, Pioli C, Nardi L, Benvenuto E, Villani ME. Effects of Simulated Space Radiations on the Tomato Root Proteome. *Front Plant Sci.* 2019 Oct 24;10:1334. doi: 10.3389/fpls.2019.01334. PMID: 31708949; PMCID: PMC6821793.
- 9: Marzioli P, Gugliermetti L, Santoni F, Delfini A, Piergentili F, Nardi L, Metelli G, Benvenuto E, Massa S, Bennici E. CultCube: Experiments in autonomous in-orbit cultivation on-board a 12-Units CubeSat platform. *Life Sci Space Res (Amst)*. 2020 May;25:42-52. doi: 10.1016/j.lssr.2020.02.005. Epub 2020 Feb 28. PMID: 32414492.
- 10: Diaz N, Lico C, Capodicasa C, Baschieri S, Dessì D, Benvenuto E, Fiori PL, Rappelli P. Production and Functional Characterization of a Recombinant Predicted Pore-Forming Protein (TVSAPLIP12) of *Trichomonas vaginalis* in *Nicotiana benthamiana* Plants. *Front Cell Infect Microbiol.* 2020 Sep 30;10:581066. doi:

10.3389/fcimb.2020.581066. PMID: 33117734; PMCID: PMC7561387.

11: Catellani M, Lico C, Cerasi M, Massa S, Bromuro C, Torosantucci A, Benvenuto E, Capodicasa C. Optimised production of an anti-fungal antibody in Solanaceae hairy roots to develop new formulations against *Candida albicans*. *BMC Biotechnol.* 2020 Mar 12;20(1):15. doi: 10.1186/s12896-020-00607-0. PMID: 32164664; PMCID: PMC7069033.

12: Desiderio A, Salzano AM, Scaloni A, Massa S, Pimpinella M, De Coste V, Pioli C, Nardi L, Benvenuto E, Villani ME. Effects of Simulated Space Radiations on the Tomato Root Proteome. *Front Plant Sci.* 2019 Oct 24;10:1334. doi: 10.3389/fpls.2019.01334. PMID: 31708949; PMCID: PMC6821793.

13: Massa S, Presenti O, Benvenuto E, *Engineering Plants for the Future: Farming with Value-Added Harvest*. In: *Progress in Botany*, Springer, Berlin, Heidelberg, 2018; pp. 1-44 doi: 10.1007/124\_2018\_20

14: Villani ME, Massa S, Lopresto V, Pinto R, Salzano AM, Scaloni A, Benvenuto E, Desiderio A. Effects of high-intensity static magnetic fields on a root-based bioreactor system for space applications. *Life Sci Space Res (Amst).* 2017 Nov;15:79-87. doi: 10.1016/j.lssr.2017.09.002. Epub 2017 Sep 28. PubMed PMID: 29198317.

15: Marusic C, Pioli C, Stelter S, Novelli F, Lonoce C, Morrocchi E, Benvenuto E, Salzano AM, Scaloni A, Donini M. N-glycan engineering of a plant-produced anti-CD20-hIL-2 immunocytokine significantly enhances its effector functions. *Biotechnol Bioeng.* 2018 Mar;115(3):565-576. doi: 10.1002/bit.26503. Epub 2017 Dec 11. PubMed PMID: 29178403.

16: Capodicasa C, Catellani M, Moschetti I, Bromuro C, Chiani P, Torosantucci A, Benvenuto E. Comparative analysis of plant-produced, recombinant dimeric IgA against cell wall  $\beta$ -glucan of pathogenic fungi. *Biotechnol Bioeng.* 2017 Dec;114(12):2729-2738. doi: 10.1002/bit.26403. Epub 2017 Sep 11. PubMed PMID: 28832951.

17: Jutras PV, Marusic C, Lonoce C, Deflers C, Goulet MC, Benvenuto E, Michaud D, Donini M. An Accessory Protease Inhibitor to Increase the Yield and Quality of a Tumour-Targeting mAb in *Nicotiana benthamiana* Leaves. *PLoS One.* 2016 Nov 28;11(11):e0167086. doi: 10.1371/journal.pone.0167086. eCollection 2016. PubMed PMID: 27893815; PubMed Central PMCID: PMC5125672.

18: Lico C, Giardullo P, Mancuso M, Benvenuto E, Santi L, Baschieri S. A biodistribution study of two differently shaped plant virus nanoparticles reveals new peculiar traits. *Colloids Surf B Biointerfaces.* 2016 Dec 1;148:431-439. doi: 10.1016/j.colsurfb.2016.09.019. Epub 2016 Sep 14. PubMed PMID: 27648774.

19: De Martinis D, Rybicki EP, Fujiyama K, Franconi R, Benvenuto E. Editorial: Plant Molecular Farming: Fast, Scalable, Cheap, Sustainable. *Front Plant Sci.* 2016 Aug 3;7:1148. doi: 10.3389/fpls.2016.01148. eCollection 2016. PubMed PMID: 27536308; PubMed Central PMCID: PMC4971507.

20: Lonoce C, Salem R, Marusic C, Jutras PV, Scaloni A, Salzano AM, Lucretti S, Steinkellner H, Benvenuto E, Donini M. Production of a tumour-targeting antibody with a human-compatible glycosylation profile in *N. benthamiana* hairy root cultures. *Biotechnol J.* 2016 Sep;11(9):1209-20. doi: 10.1002/biot.201500628. Epub 2016 Jun 30. PubMed PMID: 27313150.

21: Lopresto V, Merla C, Pinto R, Benvenuto E. High-intensity static magnetic field exposure devices for in vitro

experiments on biopharmaceutical plant factories in aerospace environments. *Conf Proc IEEE Eng Med Biol Soc.* 2015 Aug;2015:893-6. doi: 10.1109/EMBC.2015.7318506. PubMed PMID: 26736406.

22: Lico C, Benvenuto E, Baschieri S. The Two-Faced Potato Virus X: From Plant Pathogen to Smart Nanoparticle. *Front Plant Sci.* 2015 Nov 17;6:1009. doi: 10.3389/fpls.2015.01009. eCollection 2015. Review. PubMed PMID: 26635836; PubMed Central PMCID: PMC4646960.

23: Marusic C, Novelli F, Salzano AM, Scaloni A, Benvenuto E, Pioli C, Donini M. Production of an active anti-CD20-hIL-2 immunocytokine in *Nicotiana benthamiana*. *Plant Biotechnol J.* 2016 Jan;14(1):240-51. doi: 10.1111/pbi.12378. Epub 2015 Apr 16. PubMed PMID: 25879373.

24: Masci S, Laino P, Janni M, Botticella E, Di Carli M, Benvenuto E, Danieli PP, Lilley KS, Lafiandra D, D'Ovidio R. Analysis of Quality-Related Parameters in Mature Kernels of Polygalacturonase Inhibiting Protein (PGIP) Transgenic Bread Wheat Infected with *Fusarium graminearum*. *J Agric Food Chem.* 2015 Apr 22;63(15):3962-9. doi: 10.1021/jf506003t. Epub 2015 Apr 9. PubMed PMID: 25823882.

25: Hehle VK, Lombardi R, van Dolleweerd CJ, Paul MJ, Di Micco P, Morea V, Benvenuto E, Donini M, Ma JK. Site-specific proteolytic degradation of IgG monoclonal antibodies expressed in tobacco plants. *Plant Biotechnol J.* 2015 Feb;13(2):235-45. doi: 10.1111/pbi.12266. Epub 2014 Oct 4. PubMed PMID: 25283551.

26: Di Carli M, Tanno B, Capodicasa C, Villani ME, Salzano AM, Scaloni A, Raschellà G, Benvenuto E, Donini M. Proteome changes induced by c-myc silencing in human chronic myeloid leukemia cells suggest molecular mechanisms and putative biomarkers of hematopoietic malignancies. *J Proteomics.* 2014 Jan 16;96:200-22. doi: 10.1016/j.jprot.2013.10.040. Epub 2013 Nov 9. PubMed PMID: 24220303.

27: Arcangeli C, Circelli P, Donini M, Aljabali AA, Benvenuto E, Lomonosoff GP, Marusic C. Structure-based design and experimental engineering of a plant virus nanoparticle for the presentation of immunogenic epitopes and as a drug carrier. *J Biomol Struct Dyn.* 2014 Apr;32(4):630-47. doi: 10.1080/07391102.2013.785920. Epub 2013 May 15. PubMed PMID: 23672348.

28: Di Carli M, Benvenuto E, Donini M. Recent Insights into Plant-Virus Interactions through Proteomic Analysis. *J Proteome Res.* 2012 Oct 5;11(10):4765-80. doi: 10.1021/pr300494e. Epub 2012 Sep 24. PubMed PMID: 22954327.

29: Lombardi R, Donini M, Villani ME, Brunetti P, Fujiyama K, Kajiura H, Paul M, Ma JK, Benvenuto E. Production of different glycosylation variants of the tumour-targeting mAb H10 in *Nicotiana benthamiana*: influence on expression yield and antibody degradation. *Transgenic Res.* 2012 Oct;21(5):1005-21. doi: 10.1007/s11248-012-9587-1. Epub 2012 Jan 12. PubMed PMID: 22238065.

30: Buriani G, Mancini C, Benvenuto E, Baschieri S. Heat-shock protein 70 from plant biofactories of recombinant antigens activate multiepitope-targeted immune responses. *Plant Biotechnol J.* 2012 Apr;10(3):363-71. doi:10.1111/j.1467-7652.2011.00673.x. Epub 2012 Jan 6. PubMed PMID: 22221920.

31: Falvo S, Di Carli M, Desiderio A, Benvenuto E, Moglia A, America T, Lanteri S, Acquadro A. 2-D DIGE analysis of UV-C radiation-responsive proteins in globe artichoke leaves. *Proteomics.* 2012 Feb;12(3):448-60.

doi: 10.1002/pmic.201100337. Epub 2012 Jan 13. PubMed PMID: 22162389.

32: Capuano F, Bond NJ, Gatto L, Beaudoin F, Napier JA, Benvenuto E, Lilley KS, Baschieri S. LC-MS/MS Methods for Absolute Quantification and Identification of Proteins Associated with Chimeric Plant Oil Bodies. *Anal Chem*. 2011 Nov 16. [Epub ahead of print] PubMed PMID: 22017570.

33: Betti C, Lico C, Maffi D, D'Angeli S, Altamura MM, Benvenuto E, Faoro F, Baschieri S. Potato virus X movement in *Nicotiana benthamiana*: new details revealed by chimeric coat protein variants. *Mol Plant Pathol*. 2011 Aug 19. doi:10.1111/j.1364-3703.2011.00739.x. [Epub ahead of print] PubMed PMID: 21851552.

34: Circelli P, Donini M, Villani ME, Benvenuto E, Marusic C. Efficient *Agrobacterium*-based transient expression system for the production of biopharmaceuticals in plants. *Bioeng Bugs*. 2010 May-Jun;1(3):221-4. Epub 2010 Mar 2. PubMed PMID: 21326930; PubMed Central PMCID: PMC3.

35: Capodicasa C, Chiani P, Bromuro C, De Bernardis F, Catellani M, Palma AS, Liu Y, Feizi T, Cassone A, Benvenuto E, Torosantucci A. Plant production of anti-D-glucan antibodies for immunotherapy of fungal infections in humans. *Plant Biotechnol J*. 2011 Sep;9(7):776-87. doi: 10.1111/j.1467-7652.2010.00586.x. Epub 2011 Jan 25. PubMed PMID: 21265996.

36: Di Carli M, Zamboni A, Pè ME, Pezzotti M, Lilley KS, Benvenuto E, Desiderio A. Two-dimensional differential in gel electrophoresis (2D-DIGE) analysis of grape berry proteome during postharvest withering. *J Proteome Res*. 2011 Feb 4;10(2):429-46. Epub 2010 Dec 1. PubMed PMID: 20945943.

37: Zamboni A, Di Carli M, Guzzo F, Stocchero M, Zenoni S, Ferrarini A, Tononi P, Toffali K, Desiderio A, Lilley KS, Pè ME, Benvenuto E, Delledonne M, Pezzotti M. Identification of putative stage-specific grapevine berry biomarkers and omics data integration into networks. *Plant Physiol*. 2010 Nov;154(3):1439-59. Epub 2010 Sep 8. PubMed PMID: 20826702; PubMed Central PMCID: PMC2971619.

38: Di Carli M, Villani ME, Bianco L, Lombardi R, Perrotta G, Benvenuto E, Donini M. Proteomic analysis of the plant-virus interaction in cucumber mosaic virus (CMV) resistant transgenic tomato. *J Proteome Res*. 2010 Nov 5;9(11):5684-97. Epub 2010 Oct 11. PubMed PMID: 20815412.

39: Komarova TV, Baschieri S, Donini M, Marusic C, Benvenuto E, Dorokhov YL. Transient expression systems for plant-derived biopharmaceuticals. *Expert Rev Vaccines*. 2010 Aug;9(8):859-76. Review. PubMed PMID: 20673010.

40: Buriani G, Mancini C, Benvenuto E, Baschieri S. Plant heat shock protein 70 as carrier for immunization against a plant-expressed reporter antigen. *Transgenic Res*. 2011 Apr;20(2):331-44. Epub 2010 Jun 18. PubMed PMID: 20559870.

41: Lombardi R, Villani ME, Di Carli M, Brunetti P, Benvenuto E, Donini M. Optimisation of the purification

process of a tumour-targeting antibody produced in *N. benthamiana* using vacuum-agroinfiltration. *Transgenic Res.* 2010 Dec;19(6):1083-97. Epub 2010 Mar 15. PubMed PMID: 20229286.

42: Lombardi R, Circelli P, Villani ME, Buriani G, Nardi L, Coppola V, Bianco L, Benvenuto E, Donini M, Marusic C. High-level HIV-1 Nef transient expression in *Nicotiana benthamiana* using the P19 gene silencing suppressor protein of Artichoke Mottled Crinckle Virus. *BMC Biotechnol.* 2009 Nov 20;9:96. PubMed PMID: 19930574; PubMed Central PMCID: PMC2785776.

43: Lico C, Mancini C, Italiani P, Betti C, Boraschi D, Benvenuto E, Baschieri S. Plant-produced potato virus X chimeric particles displaying an influenza virus-derived peptide activate specific CD8+ T cells in mice. *Vaccine.* 2009 Aug 13;27(37):5069-76. Epub 2009 Jun 27. PubMed PMID: 19563889.

44: Marusic C, Vitale A, Pedrazzini E, Donini M, Frigerio L, Bock R, Dix PJ, McCabe MS, Bellucci M, Benvenuto E. Plant-based strategies aimed at expressing HIV antigens and neutralizing antibodies at high levels. Nef as a case study. *Transgenic Res.* 2009 Aug;18(4):499-512. Epub 2009 Jan 25. Review. PubMed PMID:19169897; PubMed Central PMCID: PMC2758358.

45: Bianco L, Lopez L, Scalone AG, Di Carli M, Desiderio A, Benvenuto E, Perrotta G. Strawberry proteome characterization and its regulation during fruit ripening and in different genotypes. *J Proteomics.* 2009 May 2;72(4):586-607. Epub 2008 Dec 7. PubMed PMID: 19135558.

46: Di Carli M, Villani ME, Renzone G, Nardi L, Pasquo A, Franconi R, Scaloni A, Benvenuto E, Desiderio A. Leaf proteome analysis of transgenic plants expressing antiviral antibodies. *J Proteome Res.* 2009 Feb;8(2):838-48. PubMed PMID:19099506.

47: Villani ME, Morgun B, Brunetti P, Marusic C, Lombardi R, Pisoni I, Bacci C, Desiderio A, Benvenuto E, Donini M. Plant pharming of a full-sized, tumour-targeting antibody using different expression strategies. *Plant Biotechnol J.* 2009 Jan;7(1):59-72. Epub 2008 Sep 10. PubMed PMID: 18793269.

48: de Virgilio M, De Marchis F, Bellucci M, Mainieri D, Rossi M, Benvenuto E, Arcioni S, Vitale A. The human immunodeficiency virus antigen Nef forms protein bodies in leaves of transgenic tobacco when fused to zeolin. *J Exp Bot.* 2008;59(10):2815-29. Epub 2008 Jun 6. PubMed PMID: 18540021; PubMed Central PMCID: PMC2486477.

49: Massa S, Simeone P, Muller A, Benvenuto E, Venuti A, Franconi R. Antitumor activity of DNA vaccines based on the human papillomavirus-16 E7 protein genetically fused to a plant virus coat protein. *Hum Gene Ther.* 2008 Apr;19(4):354-64. PubMed PMID: 18439124.

50 Villani ME, Morea V, Consalvi V, Chiaraluce R, Desiderio A, Benvenuto E, Donini M. Humanization of a highly stable single-chain antibody by structure-based antigen-binding site grafting. *Mol Immunol.* 2008 May;45(9):2474-85. Epub 2008 Mar 3. PubMed PMID: 18313757.

- 51: Villani ME, Di Carli M, Donini M, Traversini G, Lico C, Franconi R, Benvenuto E, Desiderio A. Validation of a stable recombinant antibodies repertoire for the direct selection of functional intracellular reagents. *J Immunol Methods*. 2008 Jan 1;329(1-2):11-20. Epub 2007 Oct 1. PubMed PMID: 17980894.
- 52: Marusic C, Nuttall J, Buriani G, Lico C, Lombardi R, Baschieri S, Benvenuto E, Frigerio L. Expression, intracellular targeting and purification of HIV Nef variants in tobacco cells. *BMC Biotechnol*. 2007 Feb 26;7:12. PubMed PMID:17324250; PubMed Central PMCID: PMC1808453.
- 53: Lico C, Capuano F, Renzone G, Donini M, Marusic C, Scaloni A, Benvenuto E, Baschieri S. Peptide display on Potato virus X: molecular features of the coat protein-fused peptide affecting cell-to-cell and phloem movement of chimeric virus particles. *J Gen Virol*. 2006 Oct;87(Pt 10):3103-12. PubMed PMID: 16963770.
- 54: Donini M, Lico C, Baschieri S, Conti S, Magliani W, Polonelli L, Benvenuto E. Production of an engineered killer peptide in *Nicotiana benthamiana* by using a potato virus X expression system. *Appl Environ Microbiol*. 2005 Oct;71(10):6360-7. PubMed PMID: 16204558; PubMed Central PMCID: PMC1265961.
- 55: Villani ME, Roggero P, Bitti O, Benvenuto E, Franconi R. Immunomodulation of cucumber mosaic virus infection by intrabodies selected in vitro from a stable single-framework phage display library. *Plant Mol Biol*. 2005 Jun;58(3):305-16. PubMed PMID: 16021397.
- 56: Donini M, Morea V, Desiderio A, Pashkoulov D, Villani ME, Tramontano A, Benvenuto E. Engineering stable cytoplasmic intrabodies with designed specificity. *J Mol Biol*. 2003 Jul 4;330(2):323-32. PubMed PMID: 12823971.
- 57: Arias FJ, Antolín P, de Torre C, Barriuso B, Iglesias R, Rojo MA, Ferreras JM, Benvenuto E, Méndez E, Girbés T. Musarmins: three single-chain ribosome-inactivating protein isoforms from bulbs of *Muscari armeniacum* L. and Miller. *Int J Biochem Cell Biol*. 2003 Jan;35(1):61-78. PubMed PMID: 12467648.
- 58: Marusic C, Rizza P, Lattanzi L, Mancini C, Spada M, Belardelli F, Benvenuto E, Capone I. Chimeric plant virus particles as immunogens for inducing murine and human immune responses against human immunodeficiency virus type 1. *J Virol*. 2001 Sep;75(18):8434-9. PubMed PMID: 11507188; PubMed Central PMCID: PMC115088.
- 59: Desiderio A, Franconi R, Lopez M, Villani ME, Viti F, Chiaraluce R, Consalvi V, Neri D, Benvenuto E. A semi-synthetic repertoire of intrinsically stable antibody fragments derived from a single-framework scaffold. *J Mol Biol*. 2001 Jul 13;310(3):603-15. PubMed PMID: 11439027.
- 60: Roggero P, Ciuffo M, Benvenuto E, Franconi R. The expression of a single-chain Fv antibody fragment in different plant hosts and tissues by using Potato virus X as a vector. *Protein Expr Purif*. 2001 Jun;22(1):70-4. PubMed PMID: 11388801.



- 61: Tavladoraki P, Girotti A, Donini M, Arias FJ, Mancini C, Morea V, Chiaraluce R, Consalvi V, Benvenuto E. A single-chain antibody fragment is functionally expressed in the cytoplasm of both *Escherichia coli* and transgenic plants. *Eur J Biochem.* 1999 Jun;262(2):617-24. PubMed PMID: 10336651.
- 62: Franconi R, Roggero P, Pirazzi P, Arias FJ, Desiderio A, Bitti O, Pashkoulov D, Mattei B, Bracci L, Masenga V, Milne RG, Benvenuto E. Functional expression in bacteria and plants of an scFv antibody fragment against tospoviruses. *Immunotechnology.* 1999 Mar;4(3-4):189-201. PubMed PMID: 10231089.
- 63: Bolognesi A, Polito L, Olivieri F, Valbonesi P, Barbieri L, Battelli MG, Carusi MV, Benvenuto E, Del Vecchio Blanco F, Di Maro A, Parente A, Di Loreto M, Stirpe F. New ribosome-inactivating proteins with polynucleotide:adenosine glycosidase and antiviral activities from *Basella rubra* L. and *bougainvillea spectabilis* Willd. *Planta.* 1997 Dec;203(4):422-9. PubMed PMID: 9421927.
- 64: Benvenuto E, Tavladoraki P. Immunotherapy of plant viral diseases. *Trends Microbiol.* 1995 Jul;3(7):272-5. Review. PubMed PMID: 7551641.
- 65: Tavladoraki P, Benvenuto E, Trinca S, De Martinis D, Cattaneo A, Galeffi P. Transgenic plants expressing a functional single-chain Fv antibody are specifically protected from virus attack. *Nature.* 1993 Dec 2;366(6454):469-72. PubMed PMID: 8247156.
- 66: Benvenuto E, Ordàs RJ, Tavazza R, Ancora G, Biocca S, Cattaneo A, Galeffi P. 'Phytoantibodies': a general vector for the expression of immunoglobulin domains in transgenic plants. *Plant Mol Biol.* 1991 Oct;17(4):865-74. PubMed PMID:1717050.
- 67: Tavazza M, Lucioli A, Ancora G, Benvenuto E. cDNA cloning of artichoke mottled crinkle virus RNA and localization and sequencing of the coat protein gene. *Plant Mol Biol.* 1989 Dec;13(6):685-92. PubMed PMID: 2491684.
- 68: Costantino P, Spanò L, Pomponi M, Benvenuto E, Ancora G. The T-DNA of *Agrobacterium rhizogenes* is transmitted through meiosis to the progeny of hairy root plants. *J Mol Appl Genet.* 1984;2(5):465-70. PubMed PMID:6090564.