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AS > Vol.2 No.1, February 2011



Introduction of a new atmospheric pressure plasma device and application on tomato seeds

PDF (Size: 997KB) PP. 23-27 DOI: 10.4236/as.2011.21004

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ABSTRACT

We designed new atmospheric pressure plasma device, to explore appropriate voltage of plasma treatment that promote traits and yield of to-mato, tomato seeds were treated by plasma at 4760 to 6800 V, and traits and yield of tomato were observed. The results showed that the ef-fects of different voltage plasma treatments on seed germination were not the same. The bloom times, the height, the caulis, the extent of the plants and the average weight, length, diameter of each fruit in the seven treatment groups from 4760 to 6800 V were increased distinctly. The tomato yields of seven different plasma voltage treated groups were increased than the un-treated (CK). In most indexes of our tests, ef-fects of (5440 ~ 6120 V) plasma voltage treat-ments were better than of other voltages, the best was 6120 V plasma voltage treatment. So the tomato yield increase and the most the botany properties of the tomato are improved. The discharges were not uniform and the pow-ers were lower in low voltages (4760 ~ 5100V), and the discharge powers were higher in high voltages (6460 ~ 6800V). There was a step un-altered violet blue light from 5440V to 6120V, it was nearly uniform discharges, it maybe due to the energy of the electron and the active air particles in the plasma increasing with atmos-pheric plasma voltage adding, more electric charges are produced per unit time and cannot be neutralized at once, which can strengthen the reaction between the active air particles and seeds. The active air particles and ultraviolet radiation can penetrate into the capsule of the seeds, accelerate to decompose the inner nu-triment of the seeds, reduce relative penetrabil-ity of cell velum, improve the activities of the root of the tomato seedling. Test data of fruit yield of the tomato are consistent with the sta-tistical regressive line.

KEYWORDS

Atmospheric Pressure Plasma; Treat Voltage; Tomato Seed; Yield

Cite this paper

 Zhou, Z. , Huang, Y. , Yang, S. and Chen, W. (2011) Introduction of a new atmospheric pressure plasma device and application on tomato seeds. *Agricultural Sciences*, 2, 23-27. doi: 10.4236/as.2011.21004.

References

- [1] Li, H.Z. and Pang, J.A. (2003) Progress of study on seed treatment of physical techniques in cucumber. *Agriculture & Technology*, 23, 47-49.
- [2] Li, J.W., Sun, Z.K., Yang, S., Zou, Z.Y. and Cong, Y. (1997) A preliminary report on the application of 60 CO-γ to cucumber mutation breeding. *China Vegetables*, 22, 22-24.
- [3] Wang, Y.H., Han, L.B., Yin, S.X., Liu, G.H. and Chen, X.X. (2006) The effect of 60 CO-γ ray irradiation on seeds germination and the activity of enzymes of seeds of Kentucky bluegrass. *Chinese Journal of Grassland*, 28, 54-57.
- [4] Lin, R.R. (1999) Application of magnetic treatment in agriculture. *Journal of Fujian Agriculture University*, 28, 509-512.
- [5] Xiao, W., Wang, Y.L. and Guan, Z.Q. (2004) The effect of magnetized water on seed germination and physiologic norm of balsam pera. *Biomagnetism*, 4, 7-10.
- [6] Wu, X.H., Sun, W.M. and Zhang, H.Y. (2005) Effects of high voltage electrostatic field on biogicalo

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- [7] Rajput, M.A. and Qureshi, M.J. (1973) Effect of gamma-irradiation on germination, seedling growth and chlorophyll content in mung bean. *Sabrao Newsletter*, 5, 39-42.
- [8] Carstensen, E.L. (1997) Biological effects of power frequency electric fields. *Journal of Electrostatics*, 39, 157-174. doi:10.1016/S0304-3886(97)00003-X
- [9] Souza, T.A., Porras, L.E. and Casate, F.R. (1999) Effect of magnetic treatment of tomato (*Lycopersicon esculentum* Mill) seeds on germination and seedling growth. *Horticultural Abstracts*, 70, 6892.
- [10] Thimmaiah, S.K., Mahadevu, P. and Srinivasappa, K.N. (1998) Effect of gamma-irradiation on seed germination and seedling vigour in cowpea [*vigna unguiculata* (L.) walp]. *Journal of Nuclear Agriculture and Biology*, 27, 142-145.
- [11] Garcia, R.F. and Arza, P.L. (2001) Influence of a stationary magnetic field on water relations in lettuce seeds. Part 1: Theoretical consideration of magnetics. *Bioelectromagnetics*, 22, 589-595. doi:10.1002/bem.88
- [12] Xia, L.H., Yi, Y.L., Liu, X.Y. and Liu, J. (1999) Study on effect of magnetic field on cucumber seed. *Journal of Shenyang Agriculture University*, 30, 24-26.
- [13] Chen, J.G., Jin, Z. and Li, S.H. (1995) The development of the nonvacuum pulsed electronic beam apparatus and its mutagenic effects on pea seeds. *Journal of Nuclear Agriculture*, 9, 7-9.
- [14] Wang, M., Chen, Q.Y., Chen, G.L. and Yang, S.Z. (2007) Effect of atmospheric pressure plasma on growth and development of lettuce. *ACTA Agricultural Boreali-Sinica*, 22, 108-113.
- [15] Wang, M., Yang, S.Z., Chen, Q.Y., Gao, L.H., Chen, G.L. and Liu, X.J. (2007) Effects of atmospheric pressure plasma on seed germination and seedling growth of cucumber. *Transactions of the CSAE*, 23, 195-200.
- [16] Zhou, Z.W., Huang, Y.F., Deng, M.S. and Yang, S.Z. (2010) Effects of eggplant seed treatment with atmospheric pressure plasma on plant growth and yield. *China Vegetables*, 207, 62-66.
- [17] Chen, G.L., Fan, S.H., Li, C.L., Gu, W.C., Feng, W.R. and Yang, S.Z. (2005) A novel atmospheric pressure plasma fluidized bed and its application in mutation of plant seed. *Chinese Physics Letters*, 22, 1980-1983. doi:10.1088/0256-307X/22/8/044
- [18] Zhou, Z.W., Huang, Y.F., Deng, M.S. and Yang, S.Z. (2009) Effects of atmospheric pressure plasma on the eggplant seed on the eggplant yield and quality. *Modern Agricultural Sci-Tech*, 19, 94-96.
- [19] Huang, Y.F. and Zhou, Z.W. (2010) Applied effect of atmospheric pressure plasma technology to eggplant. *Seed*, 29, 73-75.