

## STUDIES ON INDIGENOUS COW (*BOSINDICUS*) BASED BIO-ORGANIC FORMULATIONS (BOFS) IN TOMATO CULTIVATION FOR INCREASING SOIL HEALTH STIPULATION

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**Abstract:** India harvests a large variety of food crops including vegetables, cereals, pulses, oilseeds etc. In the name of increased productivity, unselective application of vast quantity of chemical fertilizers is being encouraged which is health deathtrap. Hence, an organic method of farming is of vital need which could satisfy the increased demand of food production as well as can provide a security against any possible health problem. In present study, a single transplanted plant per pot was elevated with manual and natural irrigation in environmental condition. The result showed that the plant enactment with respect to biomass components such as number of fruits, fruits weight, fresh shoot and root weight, dry shoot and root weight, shoot length and plant height were expressively influenced by used bio-organic formulations. The total plant biomass was found to be higher with application of Dasha Parni Extract (DPE, 45 ml/plant), Leaf Extract of *Azadirachta indica* (LEAI, 50ml/plant) and *Azadirachta Capsicum Alliums* Extract (ACAE, 55 ml/plant) as compared to combination of aforesaid bio-organic formulations. Similar trend was noticed with respect to fruit weight and plant height which were found to be significantly higher 83gm and 50cm respectively when plant treated with 55ml/plant dosage, 65gm and 35cm respectively with 50 ml/plant dosage and 91gm and 43cm respectively when treated with 45 ml/plant dosage. Thus, based on this study, it may be concluded that method used for the production of tomato with the help of Bio-organic formulations (BOFs) as organic supplements, when implemented, can be effective, economical and eco-friendly method for production of various agriculture crops by farmers.

**Keywords:** *Bos indicus*, Bio-organic Formulations, Tomato, Soil health stipulation

### REFERENCES

Anbalagan, R., Srikanth, P., Mani, M., Barani, R., Seshadri, K.G. and Janarthanan, R. (2017). Next generation sequencing of oral microbiota in Type 2 diabetes mellitus prior to and after neem stick usage and correlation with serum monocyte chemoattractant-1. *Diabetes Res Clin Pract.* **130**:204-210.

Avinash, B., Venu, R., Prasad, TNVKV, Alpha Raj, M., Srinivasa, Rao, K. and Srilatha, C. (2017). Synthesis and of neem leaf extract, 2, 3-dehydrosalanol and quercetindihydrate mediated silver nano particles for therapeutic applications. *IET Nanobiotechnol.* **11(4)**:383-389.

Ashara, K.C. and Shah, K.V. (2017). Emulsion of Chloramphenicol: an Overwhelming Approach for Ocular Delivery. *Folia Med (Plovdiv).* **59(1)**:23-30.

Ali, R.F. and El-Anany, A.M. (2017). Stabilization of Neem Oil Biodiesel with Corn Silk Extract during Long-term Storage. *J Oleo Sci.* **66(2)**:133-145.

Alali, F.Q., Kaakeh, W., Bennett, G.W. and McLaughlin, J.L. (1998). Annonaceousacetogenins as natural pesticides: potent toxicity against insecticide-susceptible and -resistant German cockroaches (Dictyoptera: Blattellidae). *J Econ Entomol.* **91(3)**:641-9.

Aribi, N., Oulhaci, M.C., Kilani-Morakchi, S., Sandoz, J.C., Kaiser, L., Denis, B. and Joly, D. (2017). Azadirachtin impact on mate choice, female sexual receptivity and male activity in *Drosophila*

*melanogaster* (Diptera: Drosophilidae). *PesticBiochem Physiol.* **143**:95-101.

Avinash, B., Venu, R., Alpha Raj, M., Srinivasa Rao, K., Srilatha, C. and Prasad, T.N. (2017). In vitro evaluation of acaricidal activity of novel green silver nanoparticles against deltamethrin resistance *Rhipicephalus (Boophilus) microplus*. *Vet Parasitol.* **237**:130-136.

Hajek, A.E. and St. Leger (1994). Interactions between fungal pathogens and insect hosts, annual Review of Entomology. **39**:293 - 322.

Breda, M.O., Oliveira, J.V., EstevesFilho, A.B., Barbosa, D.R. and Santos, A.A. (2017). Lethal and sublethal effects of pesticides in the management of *Polyphagotarsonemuslatus* (Banks) (Acari: Tarsonemidae) on *Capsicum annum* L. *Pest Manag Sci.* **73(10)**:2054-2062.

Bahlai, C.A., Xue, Y., McCreary, C.M., Schaafsma, A.W. and Hallett, R.H. (2010). Choosing organic pesticides over synthetic pesticides may not effectively mitigate environmental risk in soybeans. *PLoS One.* **5(6)**:e11250.

Bernardes, R.C., Barbosa, W.F., Martins, G.F. and Lima, MAP. (2018). The reduced-risk insecticide azadirachtin poses a toxicological hazard to stingless bee *Partamonahelleri* (Friese, 1900) queens. *Chemosphere.* **201**:550-556.

Badshah, H., Ullah, F., Calatayud, P.A., Ullah, H. and Ahmad, B. (2017). Can toxicants used against cotton mealybug *Phenacoccusolenopsis* be compatible with an encyrtid parasitoid

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- Aenasius bambawalei under laboratory conditions? *Environ Sci Pollut Res Int.* **24(6)**:5857-5867.
- Birch, A.N.E.** (2011). How agro-ecological research helps to address food security issues under new IPM and pesticide reduction policies for global crop production systems. *J Exp Bot.* **62**:3251-3261.
- Biondi, N., Piccardi, R., Margheri, M.C., Rodolfi, L., Smith, G.D. and Tredici, M.R.** (2004). Evaluation of Nostoc strain ATCC 53789 as a potential source of natural pesticides. *Appl Environ Microbiol.* **70(6)**:3313-20.
- Benelli, G., Caselli, A., Di Giuseppe, G. and Canale, A.** (2018). Control of biting lice, Mallophaga - a review. *Acta Trop.* **177**: 211-219.
- Benelli, G., Buttazzoni, L., Canale, A., D'Andrea, A., Del Serrone, P., Delrio, G., Foxi, C., Mariani, S., Savini, G., Vadivalagan, C., Murugan, K., Toniolo, C., Nicoletti, M. and Serafini, M.** (2017). Bluetongue outbreaks: Looking for effective control strategies against Culicoides vectors. *Res Vet Sci.* **115**:263-270.
- Chaudhary, S., Kanwar, R.K., Sehgal, A., Cahill, D.M., Barrow, C.J., Sehgal, R. and Kanwar, J.R.** (2017). Progress on zadirachta indica Based Biopesticides in Replacing Synthetic Toxic Pesticides. *Front Plant Sci.* **8(8)**:610.
- Charleston, D.S., Gols, R., Hordijk, K.A., Kfir, R., Vet, L.E. and Dicke, M.** (2006). Impact of botanical pesticides derived from *Melia azedarach* and *Azadirachta indica* plants on the emission of volatiles that attract Parasitoids of the diamondback moth to cabbage plants. *J Chem Ecol.* **32(2)**:325-49.
- Campos, EVR, Proença, PLF, Oliveira, J.L., Melville, C.C., Della Vechia, J.F., de Andrade, D.J. and Fraceto, L.F.** (2018). Chitosan nanoparticles functionalized with  $\beta$ -cyclodextrin: a promising carrier for botanical pesticides. *Sci Rep.* **8(1)**:2067.
- De Keyser, R., Cassidy, C., Laban, S., Gopal, P., Pickett, J.A., Reddy, Y.K., Prasad, M., Prasad, G., Chirukandoth, S., Senthilven, K., Carpenter, S. and Logan, J.G.** (2017). Insecticidal effects of deltamethrin in laboratory and field populations of Culicoides species: how effective are host-contact reduction methods in India? *Parasit Vectors.* **10(1)**:54.
- Fernández, D., Vermeirssen, ELM, Bandow, N., Muñoz, K. and Schäfer, R.B.** (2014). Calibration and field application of passive sampling for episodic exposure to polar organic pesticides in streams. *Environ Pollut.* **194**: 196-202.
- Franco, P., Rampino, M., Ostellino, O., Schena, M., Pecorari, G., Garzino Demo, P., Fasolis, M., Arcadipane, F., Martini, S., Cavallin, C., Airolidi, M. and Ricardi, U.** (2017). Management of acute skin toxicity with *Hypericum perforatum* and neem oil during platinum-based concurrent chemoradiation in head and neck cancer patients. *Med Oncol.* **34(2)**:30
- Fontcuberta, M., Arqués, J.F., Villalbí, J.R., Martínez, M., Centrich, F., Serrahima, E., Pineda, L., Duran, J. and Casas, C.** (2008). Chlorinated organic pesticides in marketed food: Barcelona, 2001-06. *Sci Total Environ.* **389(1)**:52-7.
- Gao, Q., Sun, J., Xun, H., Yao, X., Wang, J. and Tang, F.** (2017). A new azadirachta from the crude extracts of neem (*Azadirachta indica* A. Juss) seeds. *Nat Prod Res.* **31(15)**:1739-1746.
- Gramatica, P., Corradi, M. and Consonni, V.** (2000). Modelling and prediction of soil sorption coefficients of non-ionic organic pesticides by molecular descriptors. *Chemosphere.* **41(5)**:763-77.
- Guven, K., Yolcu, M., Gul-Guven, R., Erdogan, S. and Pomerai, D.D.** (2005). The effects of organic pesticides on inner membrane permeability in *Escherichia coli* ML35. *Cell Biol Toxicol.* **21(2)**:73-81.
- Galanopoulou, S., Vgenopoulos, A. and Conispoliatis, N.** (2005). DDTs and other chlorinated organic pesticides and polychlorinated biphenyls pollution in the surface sediments of Keratsiniharbour, Saronikos gulf, Greece. *Mar Pollut Bull.* **50(5)**:520-5.
- Hall, A.J. and Thomas, G.O.** (2007). Polychlorinated biphenyls, DDT, polybrominated diphenyl ethers, and organic pesticides in United Kingdom harbor seals (*Phocavitulina*)-mixed exposures and thyroid homeostasis. *Environ Toxicol Chem.* **26(5)**:851-61.
- Hu, R., Yin, C., Wang, Y., Lu, C. and Ge, T.** (2008). QSPR study on GC relative retention time of organic pesticides on different chromatographic columns. *J Sep Sci.* **31(13)**:2434-43.
- Huang, Y., Liu, J., Li, L., Pang, T. and Zhang, L.** (2014). Efficacy of binary combinations of botanical pesticides for rotifer elimination in microalgal cultivation. *Bioresour Technol.* **154**:67-73.
- Hernández-Moreno, D., Soffers, A.E., Wiratno, Falke H.E., Rietjens, I.M. and Murk, A.J.** (2013). Consumer and farmer safety evaluation of application of botanical pesticides in black pepper crop protection. *Food Chem Toxicol.* **56**:483-90.
- Jr. Delalibera, I., Gomez, D.R.S., de Moraes, G.J., de Alencar, J.A. and Araujo, W.F.** (1992). Vrikshayurveda has always tried to adopt preventive measures rather the curative Infection of *Mononychellustana joa* (Acari: Tetranychidae) by the fungus *Neozygites* sp. (Zygomycetes: Entomophthorales) in northeastern Brazil, *Fla Entomol.* **75**:145-147.
- Kosini, D. and Nukenine, E.N.** (2017). Bioactivity of Novel Botanical Insecticide From *Gnidiakaussiana* (Thymeleaceae) Against *Callosobruchus maculatus* (Coleoptera: Chrysomelidae) in Stored *Vignasubterranea* (Fabaceae) Grains. *J Insect Sci.* **17(1)**.
- Konda, L.N., Czinkota, I., Füleky, G. and Morovján, G.** (2002). Modeling of single-step and

multistep adsorption isotherms of organic pesticides on soil. *J Agric Food Chem.* **50(25)**:7326-31.

**Konda, L.N., Füleky, G. and Morovján, G.** (2002). Subcritical water extraction to evaluate desorption behavior of organic pesticides in soil. *J Agric Food Chem.* **50(8)**:2338-43.

**Kilani-Morakchi, S., Bezzar-Bendjazia, R., Ferdenache, M. and Aribi, N.** (2017). Preimaginal exposure to azadirachtin affects food selection and digestive enzymes in adults of *Drosophila melanogaster* (Diptera: Drosophilidae). *PesticBiochem Physiol.* **140**:58-64.

**Kamaraj, C., Gandhi, P.R., Elango, G., Karthi, S., Chung, I.M. and Rajakumar, G.** (2018). Novel and environmental friendly approach; Impact of Neem (*Azadirachta indica*) gum nano formulation (NGNF) on *Helicoverpa armigera* (Hub.) and *Spodoptera litura* (Fab.). *Int J Biol Macromol.* **107(Pt A)**:59-69.

**Mishra, P., Tyagi, B.K., Chandrasekaran, N. and Mukherjee, A.** (2017). Biological nanopesticides: a greener approach towards the mosquito vector control. *Environ Sci Pollut Res Int.* **18**.

**Mishra, P., Samuel, M.K., Reddy, R., Tyagi, B.K., Mukherjee, A. and Chandrasekaran, N.** (2018). Environmentally benign nanometric neem-laced urea emulsion for controlling mosquito population in environment. *Environ Sci Pollut Res Int.* **25(3)**:2211-2230.

**Hoy, M.A. and Myths** (1999). Models and mitigation of resistance to pesticides. In: *Insecticide Resistance: From Mechanisms to Management* (Denholm I, Pickett J.A., and Devonshire A.L, eds.), New York, CABI Publishing. 111 - 119.

**Nkedi-Kizza, P., Shinde, D., Savabi, M.R., Ouyang, Y. and Nieves, L.** (2006). Sorption kinetics and equilibria of organic pesticides in carbonatic soils from South Florida. *J Environ Qual.* **35(1)**:268-76.

**Mabry, T. J., Markham, K. R. and Thomas, M. B.** (1970). *The systematic identification of flavanoid*, Spinger-Verlag, Berlin-Heidelberg, New York. 1-102.

**Oates, L., Cohen, M., Braun, L., Schembri, A. and Taskova, R.** (2014). Reduction in urinary organophosphate pesticide metabolites in adults after a week-long organic diet. *Environ. Res.* **132**:105-111.

**Oates, L., Cohen, M., Braun, L., Schembri, A. and Taskova, R.** (2014). Reduction in urinary organophosphate pesticide metabolites in adults after a week-long organic diet. *Environ. Res.* **132**:105-111.

**Rajeev, K.** (2013). Biochemical efficacy of home organic farming practices in okra (*abelmoschus esculentus* var). *Arkaanamika L. moench*; 1-118.

**Rajeev, K., Rivera, Rex A., Rosenkranz, H.S. and Klopman, G.** (1990). Bio-organic formulations. *Agronomist. Natural pesticides present in edible*

plants are predicted to be carcinogenic. *Carcinogenesis.* **11(2)**:349-53.

**Ruiz, I., Morales, A., Barba, A. and Oliva, J.** (2012). Determination of natural pesticides in fresh fruits using liquid chromatography/mass spectrometry. *J AOAC Int.* **95(1)**:238-43.

**Rinaldi, F., Hanieh, P.N., Longhi, C., Carradori, S., Secci, D., Zengin, G., Ammendolia, M.G., Mattia, E., Del Favero, E., Marianecchi, C. and Carafa, M.** (2017). Neem oil nanoemulsions: characterisation and antioxidant activity. *J Enzyme Inhib Med Chem.* **32(1)**:1265-1273.

**Rembalkowska, E.** (2007). Quality of plant products from organic agriculture. *J. Sci. Food Agric.* **87**:2757-2762.

**Spyrou, I.M., Karpouzas, D.G. and Menkissoglu-Spirodi, U.** (2009). Do botanical pesticides alter the structure of the soil microbial community? *Microb Ecol.* **58(4)**:715-27.

**Soubaneh, Y.D., Gagné, J.P., Lebeuf, M., Nikiforov, V., Gouteux, B. and Osman, A.M.** (2015). Sorption and competition of two persistent organic pesticides onto marine sediments: Relevance to their distribution in aquatic system. *Chemosphere.* **131**: 48-54.

**Shah, F.M., Razaq, M., Ali, A., Han, P. and Chen, J.** (2017). Comparative role of neem seed extract, moringa leaf extract and imidacloprid in the management of wheat aphids in relation to yield losses in Pakistan. *PLoS One.* **12(9)**:e0184639.

**Suman, Gupta and Biopesticides** (2010). An eco-friendly approach for pest control, *Journal of Biopesticides*, **3(1)**: 186-188.

**Semmler, M., Abdel-Ghaffar, F., Gestmann, F., Abdel-Aty, M., Rizk, I., Al-Quraishy, S., Lehmacher, W. and Hoff, N.P.** (2017). Randomized, investigator-blinded, controlled clinical study with lice shampoo (Licener®) versus dimethicone (Jacutin® Pedicul Fluid) for the treatment of infestations with head lice. *Parasitol Res.* **116(7)**:1863-1870.

**Thompson, D.G., Tonon, A., Beltran, E. and Hernandez, F.** (2017). Inhibition of larval growth and adult fecundity in Asian long-horned beetle (*Anoplophora glabripennis*) exposed to azadirachtins under quarantine laboratory conditions. *Pest Manag Sci.* 2017 **US Environmental Protection Agency, Regulating Pesticides (2008).** What are Biopesticides?

URL: <http://www.epa.gov/pesticides/biopesticides/whatare-biopesticides.htm> (accessed 28 Sept 2008). Washington, DC: US Environmental Protection Agency. **UN World Population Prospects. (2011):** The 2010 Revision, United Nations, New York, 2011.

**Wang, Z.D., Yan, T. and Wang, B.H.** (2009). Study on experiment of fluorescence spectra detection of organic pesticides in soil. *Guang Pu Xue Yu Guang Pu Fen Xi.* **29(2)**: 479-82.

- Westgate, P.J., Schultz, B.B. and Hazzard, R.V.** (2017). Effects of Carriers, Emulsifiers, and Biopesticides for Direct Silk Treatments on Caterpillar Feeding Damage and Ear Development in Sweet Corn. *J Econ Entomol.* **110(2)**:507-516.
- Wang, Z.D., Li, D.M. and Wang, Y.T.** (2007). Study on the detection of organic pesticides by fluorescence spectra. *Guang Pu Xue Yu Guang Pu Fen Xi.* **27(11)**:2321-4.
- Wu, X., Davie-Martin, C.L., Steinlin, C., Hageman, K.J., Cullen, N.J. and Bogdal, C.** (2017). Understanding and Predicting the Fate of Semi volatile Organic Pesticides in a Glacier-Fed Lake Using a Multimedia Chemical Fate Model. *Environ Sci Technol.* **51 (20)**:11752-11760.
- Xu, J., Luo, J., Ruan, J., Zhu, F., Luan, T., Liu, H., Jiang, R. and Ouyang, G.** (2014). In vivo tracing uptake and elimination of organic pesticides in fish muscle. *Environ Sci Technol.* **48(14)**: 8012-20.
- Yadav, I.C., Devi, N.L., Syed, J.H., Cheng, Z., Li, J., Zhang, G. and Jones, K.C.** (2015). Current status of persistent organic pesticides residues in air, water, and soil, and their possible effect on neighboring countries: a comprehensive review of India. *Sci Total Environ.* **511**: 123-37.
- Zhang, P., Li, X.W., Dong, L.L. and Chen, S.L.** (2016). Study on botanical pesticides and its application in production of traditional Chinese medicine. *ZhongguoZhong Yao ZaZhi.* **41 (19)**: 3579-3586
- Mona, M. and Abdalla** (2013). The potential of *Moringa oleifera* extract as a biostimulant in enhancing the growth, biochemical and hormonal contents in rocket (*Eruca vesicaria* subsp. *Sativa*) plants. *International Journal of Plant Physiology and Biochemistry.* **5(3)**: 42-49.
- Rajamani, R., Singh, Rudresh Kumar, and Lakshmi, B.** (2014). *Moringa oleifera* (PKM-1) fermented leaf juice- Part of organic integrated nutritional management in organic cultivation of *Brassica oleracea* (L.) *Journal of Biotechnology and Biosafety.* **2(2)**:61-67.