

**Short Communication****Effect of foliar application of liquid organic and inorganic fertilizers along with NAA on cowpea (*Vigna unguiculata*)****MEYYAPPAN M. AND G.SIVAKUMAR**

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Cowpea (*Vigna unguiculata*) is popularly known as lobia in India, now cultivated throughout the tropics and sub-tropics and used as pulse, green vegetable, fodder, green manure and its productivity is 683 kg ha<sup>-1</sup>. Vermiwash is a liquid leachate that is collected after the passage of water through the column of worm action. It is a collection of excretory products and mucous secretion of earthworms along with micronutrients from the soil organic molecules. This bio-liquid is rich in nutrients, microorganisms, enzymes, vitamins and plant growth hormones which increase the resistant power of crops against various diseases and enhances the productivity of crops.. The nutrients present in vermiwash are in water-soluble form and meet the immediate requirements of crop plants. Further, it contains nitrogen fixing and nutrient solubilizing bacteria. Generally, foliar spray of vermiwash of vermicomposting supplies nutrients to higher

plants more rapidly than soil and root application methods. Vermiwash spray persists on leaf surface and resulted in leaf thickness, increase in photosynthetic activity, internode growth, improved plant physiology and finally increased the yield (Selladurai *et al.*, 2009). Humic acid is a commercial product containing many elements which improve the growth and yield of cowpea. The fermented organic liquid fertilizer panchagavya contains nutrients, plant growth regulators and microorganisms which help in plant growth, yield, metabolic activities and gives resistant to pest and diseases. The commercial seaweed extract contains major and minor nutrients, amino acids, vitamins and other growth promoting substances. DAP is a complex fertilizer containing 18 % nitrogen and 46 % phosphorus. The Naphthalene acidic acid is a auxin and very effective in promoting growth and yield of pulses.

Table 1: Effect of foliar application of various treatments on growth and yield of cowpea

Treatments	Plant height(cm)	Leaves/plant 40 DAS	LAI(60 DAS)	Seed yield (Kgha <sup>-1</sup> )	BCR
T <sub>1</sub> - Water spray	41.6	5.2	1.20	670	2.24
T <sub>2</sub> -25 % Vermiwash spray	42.2	5.5	1.40	741	2.15
T <sub>3</sub> -0.6 % Humic acid spray	45.4	5.6	1.45	766	1.98
T <sub>4</sub> - 3 % Panchagavya spray	44.6	5.5	1.45	755	2.29
T <sub>5</sub> - Seaweed extract spray @ 5ml l <sup>-1</sup>	44.8	5.6	1.50	764	2.15
T <sub>6</sub> -2 % DAP + 40 ppm NAA spray	51.5	7.5	1.76	824	2.61
5 % Vermiwash + 40 ppm NAA spray	46.4	6.1	1.55	770	2.14
6 % Humic acid + 40 ppm NAA	54.2	7.2	1.66	810	2.02
3 % Panchagavya + 40 ppm NAA	47.6	6.5	1.53	798	2.32
T <sub>10</sub> -Seaweed extract 5 ml l <sup>-1</sup> + 40 ppm NAA	49.5	6.9	1.60	800	2.17
SED	0.87	0.10	0.03	15.08	
CD (p - 0.05)	2.13	0.23	0.08	33.48	

A field experiment was conducted at Department of Agronomy, Annamalai University, Annamalainagar (Tamil Nadu). The experimental farm is situated at 11° 24' N latitude, 79° 44' East longitude and at an altitude +5.79 M above mean

sea level. The texture of the experimental soil is clayey loam and low in available nitrogen (245 kg ha<sup>-1</sup>), medium in available phosphorous (16. kg ha<sup>-1</sup>) and high in available potassium (298 kg ha<sup>-1</sup>). The field experiment was conducted with

Co (cp) - 7 varieties in randomized block design and replicated thrice. The ten treatments were, water spray, Vermiwash spray @ 25%, humic acid spray @0.6%, Panchagavya spray@ 3%, Sea weed extract spray @5 ml<sup>-1</sup>, DAP @ 2%+NAA@ 40ppm spray, Vermiwash @ 25 % + NAA @ 40 ppm spray, Humic acid @0.6 % + NAA @40ppmSpray, Panchagavya @3% + NAA @ 40ppm and Seaweed extract@ 5ml<sup>-1</sup> + NAA @ 40 ppm spray. The various treatment solutions were prepared as per the schedule and were sprayed on the crops on 25 and 40 DAS by using Knapsack sprayer. A blanket fertilizer schedule of 25:50:0 kg of NPK ha<sup>-1</sup> was adopted. Required quantity of cowpea seeds were treated with Rhizobium @ 600gha<sup>-1</sup> and dibbled with a spacing of 30x10 cm. Standard cultivation practices were adopted. Growth characters like plant height, leaf number and LAI were recorded at 60, 40 and 60 DAS from five tagged plants per treatment respectively.

The plant height recorded due to various treatments ranged from 41.6 to 54.2 cm. (Table1). Among the treatments tested, the tallest plant was observed with 0.6 % humic acid + 40 ppm NAA application which excelled other treatments and enhanced the plant height up to 12.6 cm over control. Among the individual application of organic substances, humic acid (0.6 % spray) , Panchagavya spray ( 3%) and Seaweed extract spray (5 ml<sup>-1</sup>) exerted similar effect in influencing the plant height. Similar result of increased shoot length in cowpea due to seaweed extract spray @ 3 % was reported by Raguraman *et al.*(2019). Application of vermiwash alone or along with NAA increased the plant height up to 0.63 and 4.8 cm over water sprayed control, respectively. Similar result was reported by Arthur *et al.* (2003) due to sea weeds, Sellandurai *et al.* (2009) due to vermiwash and Khan *et al.* (2013) due to humic acid. The control resulted in the least plant height. The number of leaves increased due to various treatments ranged from 0.3 to 2.3. Application of 2 % DAP + 40 ppm NAA outstripped all other treatments and ranked first. The next best was humic acid @ 0.6 % + NAA @ 40 ppm application. Identical numbers of leaves of 5.5 were recorded due to the individual spray of Vermiwash (25%) and Panchagavya spray (3%) and were comparable with other individual organic substances spray. Application

of Vermiwash (25%) + NAA (40 ppm) increased the number of leaves to the tune of 0.9 over control . Control resulted in the least number of leaves/plant (5.2). The highest leaf area index of 1.76 was noticed in 2 % DAP + NAA @ 40 ppm application. The next in order was humic acid @ 0.6 % + NAA @ 40 ppm. Application of NAA along with vermiwash or Panchagavya or seaweed extract exerted same effect. Application of vermiwash alone or along with NAA increased the LAI to the tune of 0.2 and 0.35 over control respectively.

Application of 2 % DAP along with 40 ppm NAA gave a seed yield of 824 kg ha<sup>-1</sup> which was 18.6 per cent higher compared to water sprayed control and ranked first. This might be due to the timely supply of nutrients by DAP at critical periods of crop growth and auxin which enhanced the cell division, elongation, shoot development and efficient transport of photosynthates from source to sink. This result of increased plant height and yield due to DAP application at flowering and pod filling stages was reported by Uma Maheswari and Karthik ( 2017). Application of vermiwash or humic acid or Panchagavya or seaweed extract individually increased the seed yield up to 71, 96, 85 and 94 kg ha<sup>-1</sup> over control respectively. The presence of nitrogen and other nutrients and enzymes in vermiwash and humic acid might have been the reason for enhanced growth and yield components of cowpea. This result is in agreement with the report of Khan *et al.*, (2013). The same treatments when applied along with NAA increased the seed yield up to 100, 140, 128 and 130 kg ha<sup>-1</sup> over control respectively. This might be due to cell elongation, shoot development, increased leaf area, root growth, uptake of more nutrients and efficient transport of nutrients to sink. This result is in concomitance with the findings of Rajesh *et al.*, (2014). Within the treatments, the highest BCR (2.61) was noticed in DAP @ 2 % + NAA @ 40 ppm application, followed by panchagavya @ 3 % + NAA @ 40 ppm application (2.32). Application of vermiwash alone or in combination with NAA resulted with BCR values of 2.15 and 2.14 respectively.

It may be concluded from the results that the foliar application of 2 % DAP along with 40 ppm NAA is recommended to cowpea to enhance the yield and to obtain higher returns.

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