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MACHINE LEARNING IN AGRICULTURE: A COMPREHENSIVE REVIEW OF CROP PRODUCTION APPLICATIONS

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Abstract: Agriculture has been the foundation of human civilization, and this is particularly true for India, where it continues to play a crucial role in the country's economy and society. India's agricultural heritage forms the cornerstone of its economy and social structure, with its significance extending far beyond economic metrics. As the world's second-largest agricultural producer, India's farming sector, along with related industries such as forestry and fisheries, continues to be a major contributor to the nation's GDP. The study offers a thorough examination of machine learning's role in agriculture.

Keywords: Agriculture, Crop, Machine, Production

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PLANT EXTRACTS TITRATION WITH POTASSIUM PERMANGANATE TO DETERMINE ANTIOXIDANT CAPACITY

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Abstract: During cellular metabolism, some unstable molecules called free radicals are produced. Free radicals are capable of binding to other molecules and cellular structures, affecting their proper functioning, such as enzymes and cell membranes. On the contrary, cells have several systems to neutralize free radicals, for example molecules such as proteins and glutathione function as antioxidants capable of buffering the harmful effects of free radicals. An imbalance between free radicals and cellular antioxidants is known as oxidative stress. Oxidative stress has been associated with multiple diseases such as hypertension, diabetes, obesity, immunodeficiencies, cancer, etc. Currently, healthy lifestyles promote adequate nutrition and incorporate foods rich in antioxidants. Unfortunately, there is no method considered the gold standard for determining the antioxidant capacity of foods or substances. The methods used to determine antioxidant capacity use free radicals such as ORAC-PE, FRAP, TRAP, ABTS and DPPH. These methods are laborious and expensive, so the objective of this work is to evaluate potassium permanganate to determine the antioxidant capacity.

Keywords: Permanganate, Potassium, Gallic acid, Antioxidant capacity, Plant extracts

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VIRUS VECTOR RELATIONSHIP OF CHILLI LEAF CURL VIRUS AND WHITEFLY, *BEMISIA TABACI* (GENNADIUS) IN CHILLI

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Abstract : Chilli leaf curl disease (ChiLCD) caused by Chilli leaf curl virus (ChiLCV) belongs to the genus begomovirus has become a significant issue in reducing the cultivation of chilli in the tropical and subtropical parts of the Indian subcontinent. ChiLCV is transmitted by the vector whitefly [*Bemisia tabaci* (Gennadius)] in a persistent and circulative manner. Single viruliferous whitefly was able to transmit ChiLCV with the transmission efficiency of nine per cent. How ever, 100 percent transmission of ChiLCV was obtained when ten viruliferous whiteflies were released per plant. Half an hour (0.5 hr) of pre-acquisition starvation period, one hour of acquisition access feeding period (AAFP) and three hours of inoculation access feeding period (IAFP) were required to transmit the ChiLCV. The percentage of transmission was increased with increase in pre-acquisition starvation period, AAFP and IAFP. Hundred percent transmission of ChiLCV was achieved with a pre-acquisition starvation period of 2.5 hrs, AAFP of 24 hrs and IAFP of 12hrs.

Keywords: Whitefly, Acquisition access feeding period, Inoculation access feeding period, ChiLCV

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BIO-EFFICACY OF BOTANICALS AND INSECTICIDES AGAINST THRIPS, *ISOTHRIPS ORIENTALIS* BAGNALL IN JASMINE, *JASMINUM SAMBAC* L.

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Abstract: Field experiments were conducted to evaluate the efficacy of botanicals and newer insecticide molecules against thrips in jasmine. In the present study, pungam (Karanj) oil @ 2 per cent treated plants harboured minimum number of thrips on a par with *Vitex negundo* leaf extract @ 5 per cent (2.32/leaf), NSKE @ 5 per cent (2.41/leaf) stood next and were on a par between themselves. Among the insecticides, Imidacloprid 17.8 SL @ 0.30 ml /lit, Flubendiamide 39.35 SC @ 0.75 ml / lit and Thiacloprid 21.7 SC @ 0.60 ml/lit were found effective against thrips recording a reduction of 76.00, 74.67 and 72.00 per cent, respectively. The results from the present investigation can provide timely lead and valuable information towards the development and perfection in IPM programme in jasmine.

Keywords: Bio-efficacy, Botanical, Insecticides, Jasmine

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ELIMINATION OF CASSAVA MOSAIC DISEASE (CMD) CAUSED BY *CASSAVA MOSAIC VIRUS* IN CASSAVA (*MANIHOT ESCULENTA*. CRANTZ) THROUGH MERISTEM CULTURE

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Abstract: Meristem culture was followed to manage CMD caused by *Cassava mosaic virus* in cassava cv. MVD1. In meristem culture MS basal medium supplemented with 0.5 ppm of Benzyl aminopurine (BAP), 0.1 ppm of Gibberellic acid (GA_3) and 0.1 ppm of Naphthalene acetic acid (NAA) was associated with the greatest callus induction of 95%, the highest shoot induction of 90% and the highest shoot elongation of 85% in cassava cv. MVD1. MS basal medium containing 0.5 ppm of BAP and 0.1 ppm of NAA was associated with maximum root formation in cassava cv. MVD1 (67.50 %). Absence of geminivirus in meristem derived cassava plants of cv. MVD1 was confirmed through Deng's degenerate primer PCR.

Keywords: Cassava mosaic virus, Meristem culture, PCR, Deng primer

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MICROBICIDAL AND MICROBISTATIC POTENTIAL OF *BOSWELLIA SACRA* STEM BARK EXTRACTS AGAINST SELECTED CLINICAL ISOLATES

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Abstract: Objectives: The study showed the antimicrobial properties of the stem bark extracts against selected strains of microbes. The antimicrobial study of the stem bark extracts was established using a standard method. The study investigated the microbicidal and static effect of *Boswellia sacra* stembark extracts against clinical isolates. The results obtained showed that the sixteen clinical isolates obtained, *Shigella dysenteriae* (10.30%) was most predominant followed by *Escherichiacoli* (9.30%) while *Bacillussubtilis* and *Vibriocholera* were the least occurring bacteria at 2.10% each. Most of the isolates were gram-negative (53%) and the others (47%) were gram-positive. Sugar utilization test revealed that all the isolates (100%) utilized glucose and sucrose.From the sensitivity test of *Boswellia sacra* stemback extracts on clinical isolates, *Staphylococcus epidermidis, Enterococcus faecalis, Alcaligenes faecalis, Streptococcus pyogenes* showed the highest zones of inhibition while *Vibrio cholerae, Streptococcus mutans* and *Enterococcus faecalis* showed the least zones of inhibition of the fractions used. Ethanol fraction had the highest activity on the test isolates while N-butanol and N-hexane recorded the least. Susceptibility of clinical isolates to standard antibiotics sensitivities of the test bacteria against commercially available standard antibiotics. *Staphylococcus epidermidis* was the most susceptible while *Vibrio cholera* was mostly resistant to the drugs. The Zone of inhibition of extracts were compared with that of different standards like ampicillin, ciprofloxacin, norfloxacin, and chloramphenicol for antibacterial activity and nystatin and griseofulvin for antifungal activity. In conclusion, this study adheres to the ethnomedicinal claim that *Boswellia sacra* scientifically validated of its potency as antimicrobial effect against several micro-organisms.

Keywords: Microbicidal, Static, *Boswellia sacra*, Stem bark, Clinical isolates

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IMPACT OF RESIDUE AND NUTRIENT MANAGEMENT STRATEGIES ON THE GROWTH OF MAIZE IN A MAIZE-MUSTARD CROPPING SYSTEM

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Abstract: An investigation was conducted during 2022-23 and 2023-24 at the Research Farm, Raj Mohini Devi College of Agriculture and Research Station, Ambikapur, Chhattisgarh to examine the growth performance of maize in response to varied residue and nutrient management options.Experiment was laid out in strip plot design with three replications. The treatment consisted of twelve treatment combinations including four vertical factors *i.e.,* M_1- Residue removal, M_2- Residue incorporation, M_3- Residue incorporation + spray of microbial consortium on residue and M_4- Zero-tillage + residue retention and spray of microbial consortium on residue and three horizontal factors *i.e.,* N_1- 100%RDF of NPK (120:60:40 kg N:P_2O_5:K_2O ha^{-1}), N_2- 100% RDN and P and 50% RDK and N_3- 75 % RDF of NPK + 5 t FYM ha^{-1}. Results revealed that adoption of crop residue incorporation + spray of microbial consortium recorded significantly higher plant population, growth parameters of maize viz., plant height, number of leaves $plant^{-1}$, leaf area $plant^{-1}$, leaf area index, fresh weight and dry matter accumulation which was at par to residue incorporation and zero-tillage + residue retention and spray of microbial consortium. Similarly, significantly more plant population and growth parameters were recorded under 100% RDF as compared to others.

Keywords: FYM, Microbial consortium, Nutrient management, Residue management, Zero tillage