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AGRICULTURAL SCIENCES DIVISION

THE USE OF PROGESTERONE RADIOIMMUNOASSAY TECHNIQUE IN DAIRY FARM MANAGEMENT AT SMALLHOLDER AND COMMUNAL LEVELS

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Progesterone hormone is a key indicator of reproductive assessment in both humans and animals. This makes the hormone an ideal ligand for antibody production which serves as the basis for the development of immunoassay kits, such as radio-immunoassay (RIA) and enzyme-linked immunosorbent assay (ELISA) techniques. This report shows the practical application of progesterone RIA: liquid (LPRIA) and solid phase (SPRIA) techniques, for monitoring and evaluating ovarian function in dairy cattle managed under two farming systems namely, [1], at smallholder level in 3 pilot villages in Southern Luzon, Batangas (Bgy. Luyos, Tanauan), Laguna (8 villages in Sta. Cruz village in Pagsanjan) and Quezon (Bgy. Concepcion, Sariaya), and [2] at communal level in the Visayas province of Capiz (Bgy. Bailan, Pontevedra).

The technique is sensitive and reliable and has the advantage over other clinical methods as a tool for early pregnancy diagnosis in breeding management, especially for dairy cattle where milk samples can be collected on the day of breeding, and on the third week (days 19-23) after AI or natural mating, thus shortening the calving intervals, improving the reproductive efficiency of cows and the dairy industry of our country.

COMPARATIVE NITROGEN, PHOSPHORUS, AND POTASSIUM CONTENTS OF COMPOSTED BANANA, GRAPEFRUIT, AND PINEAPPLE PEELINGS

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Mindanao, the Philippines' fruit basket, is apparently experiencing fruit waste disposal problems. Utilization of composted fruit peelings as organic fertilizers attempts to solve such problems.

"Cardava" banana *(Musa paradisiaca),* grapefruit *(Citrus paradisi),* and pineapple *(Anana comosus)* peelings were gathered, weighed, soaked in water, chopped and spread on dried wide leaves, and piled alternately with Harzianum rifai activator and chicken manure to hasten decomposition. After a month, the composted materials were dried and analyzed for nitrogen, phosphorus, and potassium using modified Kjeldahl, volumetric, and flame photometric methods, respectively.

Chemical analyses show nitrogen contents of 0.88, 0.92 and 1.07 percent for the dried pineapple, banana, and grapefruit composts, respectively. Phosphorus contents (as P_2O_5) are 3.91, 3.87, and 3.84 percent, listed in the same order. Those of potassium (as K_20) are 3.19, 3.21, and 3.26 percents. Grapefruit contains significantly higher N and P.

Findings reveal that P and K levels of all three composts are comparable with such organic fertilizers as animal manures, but N is relatively lower. Average farm manure consisting of 70 percent moisture contains 0.5 percent nitrogen, 0.25 percent phosphoric acid, and 0.6 percent potash.

DEVELOPMENT OF A FARM-LEVEL DRYER

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A simply designed recirculating dryer was developed suited for farm-level operation. It was fabricated in Tacurong, Sultan Kudarat, and tested to determine

its performance. Unique in its design is the bigger drying chamber with a simple grain flow mechanism. With wet paddy as test material, the prototype has a capacity of 5 metric tons with drying capacity of 91.53% and relatively low drying cost of about P 9.93/cavan utilizing kerosene pot burners as source of heat. A commercial model fabricated by an experienced dryer is recommended to further improve its performance.

EFFECTIVENESS OF *Nerium indicum* MILL. AS INSECTICIDE TO HOUSE PESTS *Blatta orientalis* (COCKROACHES)

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Chemical control of household pests such as cockroaches *(Blatta orientalis)* is costly and hazardous to health as well as the environment. This study was conducted to determine whether the sap of adelfa *(Nerium indicum* Mill.) bark extracted by boiling in water for 35 minutes could be effective as insecticide. The extracts obtained with different weights of air dried adelfa bark to a constant volume of water (Set A treatments), were tested including extracts where kerosene (C_nH_{2n}) (Set B treatments) and alcohol (C_2H_5OH) (Set C treatments) were added. The tests were conducted in a laboratory using Completely Randomized Design as a statistical tool.

Results showed that sap of adelfa bark extracted in the proportion of 30, 20, and 10 g per 200 mL water is as effective as the commercial household insecticide used as reference standard. The addition of 25 mL of kerosene to 100 mL of extracts resulted in higher effectivity. Alcohol as additive to the extracts likewise increased effectivity.

Adelfa bark extract could be an alternative insect pest control material which could be prepared easily involving a very minimal cost. Alternative sap extraction procedures should be devised and possibilities of using the extract as a general insect control material should be explored. Caution should be undertaken to protect the health of the processor and the end user.

TERATOGENICITY OF ORGANOPHOSPHATE PESTICIDE ON *Tilapia nilotica*

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Since the ban on organochlorines, organophosphates have been extensively used in agriculture as pesticides in order to increase crop production. However, their indiscriminate use has resulted in the presence of their residues in rivers and lakes. This study evaluates the effect of commercial grade malathion S-[1,2-di(ethoxycarbonyl) ethyl] dimethyl phosphorothiolothionate EC 57 on *Tilapia nilotica* embryos. Results of this study would provide (1) baseline data on pesticide effects on nonpests, particularly on fishes, and (2) information for government agencies that will guide them in the formulation of policies on pesticide use.

Day-10 post hatching embryos that were exposed tor 60 days to sublethal doses of 0.3 mg/L malathion exhibited various aberrations. Brain defects included nuclear blebs, swollen short-stranded endoplast, and degranulated endoplasmic reticulum. The cytoplasm exhibited electron-light background and extensive vacuolations. The gonads of pesticide-treated embryos showed delay in ovarian differentiation and cavitation in older embryos. The notochord lost its secondary sheath and was significantly larger than that in the control. The gills showed epithelial lifting and mucus secretions.

UTILIZATION OF SELECTED TREE SPECIES AS HEDGEROWS FOR ROOTCROPS: A STRATEGY FOR UPLAND DEVELOPMENT IN MINDANAO

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One of the most promising agroforestry technologies for upland development today is the employment of hedgerow intercropping or the alley cropping scheme. Henceforth, utilization and evaluation of the potentials of selected tree species as hedgerows for agricultural crops particularly in the uplands are necessary.

Three leguminous trees (*Flemingia congesta, Gliricidia sepium,* and *Sesbania sesban)* were evaluated as hedgerows for gabi and camote in a cogonal upland from 1989 to 1992. The experiment was laid out in split-plot design in RCBD with three replicates.

Results showed that the hedgrows did not significantly affect the growth and yield of gabi and camote in the first cropping but did so in the second cropping. *Flemingia* ranks first in terms of influence on the performance of gabi and camote which was followed in descending order by *Giricidia* and *Sesbania.* The significant contribution of each hedgerow species to the nutrient content of the soil particularly OM, P, and K is the main reason why each hedgerow had significantly enhanced the growth and yield performance of both the alley crops and the hedgerows themselves, mainly through nitrogen fixation and nutrient cycling. *Gliricidia* exhibited the highest overall fresh weight herbage yield (84.87 t/ha) which was followed closely by *Flemingia* (81.28 t/ha); *Sesbania* yielded 47.66 t/ha. Nonetheless, in terms of dry weight herbage yield, *Flemingia* (28.58 t/ha) outyielded *Gliricidia* (21.22 t/ha) which in turn significantly differed with *Sesbania* (14.30 t/ha).

PRODUCTION OF DIETARY FIBER FROM BAGASSE

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Dietary fiber was isolated from whole bagasse and bagasse pith by prehydrolysis with water and digestion and multi-stage bleaching with sodium hydroxide and calcium hypochlorite.

Isolated dietary fiber had 55-56% alpha cellulose, 43-44% hemicellulose, 0.4-0.6 lignin, and minimal residues of sodium, chloride, and calcium.

Recovery from the test runs was 19-33% from whole bagasse and 29-38% from bagasse pith. Pure dietary fiber from whole bagasse was 99.6% while that from bagasse pith was 99.4%.

The cost of chemicals to isolate dietary fiber from whole bagasse was higher than that from bagasse pith.

TAPPING OF ALMACIGA (*Agathis philippinensis* WARB.) FOR SUSTAINED PRODUCTIVITY OF THE TREE: THE PHILIPPINE EXPERIENCE

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Tapping almaciga is a veritable economic activity. The resin obtained from the tree is called almaciga resin or Manila copal. Although regarded as a minor forest product, it is one of the leading dollar-earners for the country. It is used in the manufacture of varnishes, lacquers, soaps, paints, printing inks, linoleum, plastic, water-proofing materials, and paper sizing. It also can be used as incense in religious ceremonies, as smudge for mosquitoes, as torches, and for kindling fire. However, traditional methods of collection like deeptapping, overtapping, and frequent re-chipping, cause death of many standing trees. Considering the detrimental effects caused by such traditional methods of collection, a set of scientific techniques was developed at FPRDI. This has been introduced to and adopted by the almaciga resin licensees, farmers, and out-of-school youths in various parts of the country. This paper covers two parts: (1) the tapping practices of almaciga in the Philippines; (2) biological considerations in almaciga tapping essential for sustained resin production.

THE PROPAGATION OF MANGO PLANTING MATERIALS USING SINGLE-STEM MODIFIED INARCHING AND CLEFT GRAFTING

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The study was conducted at the University of Southeastern Philippines, Apokon Campus, Tagum, Davao del Norte, to discover modifications in propagating mango and to evaluate the survival rate as well as the economic advantages of each method. The data on the survival rate were statistically analyzed using the Variance in RCBD.

The result of the experiment was significant at the 1% level of probability but single-stem modified inarching and cleft grafting (control) did not show any significant difference. The single-stem modified inarching and cleft grafting methods were compared and the advantages were more on the single-stem modified inarching.

Based on the result of the study, it is therefore concluded that modified inarching can be one of the methods in propagating mango. The use of this method is recommended when the nursery is near the source of scions and far from the farm where mango production will be established.

GROWTH AND DEVELOPMENT OF MACAPUNO EMBRYOS FROM DWARF X MAKAPUNO HYBRIDS IN MODIFIED Y3 MEDIUM

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A modified Y3 medium formulation proved to be suitable for the growth of macapuno embryos from dwarf x macapuno hybrids. Fully mature embryos grown in the said medium had fast growth and development. An inch shoot with initial root growth could be attained in four-week cultures. After two to three passages in a four-month period, seedlings were usually ready for potting.

The seedlings grown in the modified Y3 medium were robust at the time of potting with 3 to 5 leaves and well-developed, usually profuse, root systems. Survival of the seedlings in pots was more than 80%.

RESPONSE OF COCONUT TO RECYCLING OF COCONUT CROWN RESIDUES AND CIRCLE WEEDING

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The study was conducted from 1986 to 1994 at the Davao Research Center of PCA to assess the effect of recycling coconut crown residues as organic fertilizer and of circle weeding on the yield and solid properties.

Observations revealed that coconut crown residues alone could not increase coconut production. But when it was combined with Cl (crown residues + Cl) a significant effect was noted starting the second year which was comparable with the inorganic fertilizer application of ammonium sulfate + Cl. This makes possible the substitution of coconut crown residues for ammonium sulfate as N source. Also, the use of coconut crown residues either with or without Cl increased soil pH and K content of the surface soil although these changes were not statistically significant.

The economic situation of 1994-1995 of the combined coconut crown-NaCl application (T5) indicated highest net benefit of P148.46 per tree/year or P23,159.76 per ha/year.

Removal of weeds around the base of each coconut tree did not significantly affect coconut yields though some 10-29 percent increases in copra production were noted in certain years which warrants its continued practice for sanitation purposes.

A GENETIC MAP OF JAPONICA RICE BASED ON DNA MARKERS*

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The limited genetic diversity among japonica rice cultivars has precluded their use in map construction using molecular markers. Rice molecular maps were generated using intersubspecific and interspecific crosses. However, reports indicate that majority of Philippine traditional cultivars are japonicas. Furthermore, IRR's new plant type is genetically based on japonicas. We present the first japonica rice molecular map based on a tropical X temperate japonica cross (Labelle X Italica Livorno). This map consists of 125 random amplified polymorphic DNAs and 18 restriction fragment length polymorphisms assayed on 118 F_2 plants. Total map length is 970.9 Kosambi cM with average marker spacing of 7.6 cM and markers on

*Best poster paper award in the Agricultural Sciences Division.

all chromosomes. The precentage of markers on the least marked on the 12 rice chromosomes (chromosome 10) is significantly greater than in other rice molecular maps, but fewer markers were identified on chromosomes 1 and 2. Results indicate that RAPDs are useful for linkage map construction in japonica rice. The japonica map can be used as a framework for mapping studies, in understanding the genetic differentiation of tropical and temperate japonicas, and in identifying and tagging genes in the japonica subspecies.

VIRULENCE OF RARE BACTERIAL LEAFBLIGHT *(Xanthomonas oryzae* pv *oryzae)* HAPLOTYPES AGAINST PHILIPPINE VARIETIES

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Rare haplotypes of bacterial leaf blight pathogen were identified using RFLP DNA fingerprinting from among 286 isolates collected in Northern and Central Luzon. Two probes (IS1113 and IS1112) were used to detect rare isolates based on the frequency of their occurrence. Using the standard cultivar for pathogenicity, the rare isolates were grouped into the different prevailing Philippine races. Five rare haplotypes that are classified as races 2, 3, 5, 6, and 8 were tested for virulence against 53 Philippine-bred high-yielding varieties. Shifts from less virulent to more virulent forms and vice versa were observed. A strong shift to a more virulent form was noted in a rare isolate of race 6.

RESPONSE TO INTEGRATED SOIL FERTILITY MANAGEMENT (ISFM) OF HYBRID COCONUT GROWN IN DIFFERENT AGRO-CLIMATIC CONDITIONS OF MINDANAO: I. POLONULING, SOUTH COTABATO; II. BALIANGAD, MISAMIS OCCIDENTAL; III. GUISAO, ZAMBOANGA CITY; IV. COGON, DIPOLOG CITY 1

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Four on-farm fertilizer trials were conducted in different locations of Mindanao from 1986-1994 to assess the effect of organic fertilizers and their combinations on ISFM on the growth and yield of hybrid coconut.

The application of high rates of inorganic fertilizers and combined inorganic fertilizers produced significantly higher number of leaves and living fronds from the second to the third years of fertilizing. With low and high rates of organic fertilizers, significant increases in nut yield by 141 to 168% were noted over the unfertilized palms and in copra production by 109-148%. The organic plus inorganic fertilization also produced an appreciable 67-189% nut yield increase and 69-200% copra increase over unfertilized palms. Very likely, yield improvement was due to the correction of N and Cl deficiencies of palms.

Results obtained clearly showed that nitrogen and chloride are major yield-limiting nutrients in Mindanao coconut farms and fertilization is needed to increase productivity in the region for the Philippines to be globally competitive in the world's vegetable oil market.

EFFECT OF COCONUT WATER AND POLYETHYLENE BAGS ON THE STORAGE OF LANZONES

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The chemical and quality changes of lanzones fruit during storage using coconut water as dipping solution and polyethylene bags (PEB) with or without

diffusion holes and packaging material were determined to provide some basic information on the chemical constituents and quality of the fruits. This was conducted at the Postharvest Laboratory of the Department of Horticulture, College of Agriculture, University of Southern Mindanao (USM), Kabacan, North Cotabato from September 28 to October 5, 1995.

Percent cumulative weight loss of the fruit increased gradually from the 1st day to the 7th day of storage under modified atmosphere storage. A rapid increase in weight loss, on the other hand, was observed in fruits stored at ambient conditions. Total soluble solids (TSS) increased while titratable acidity (TA) decreased.

Lanzones fruit stored under ambient conditions last only for four days after harvest. In modified atmosphere storage, the fruit remain in good condition for one week.

Results indicated that as the fruit is stored, weight loss increased gradually due to the metabolic processes taking place within the fruit, i.e., respiration and transpiration.

A follow up study should however, be conducted to further assess the chemical changes in the fruit during storage.

EFFECT OF LIGHT INTENSITY ON THE GROWTH OF DURIAN SEEDLINGS

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The effect of the light intensity on the growth of durian seedlings in terms of plant height, leaf number and size, stem diameter, petiole length, and internode length was evaluated from December 1994 to April 1995. The experiment was conducted at the University of Southern Mindanao Agricultural Research Center (USMARC), Kabacan, North Cotabato.

Durian seedlings were transplanted in black 7" x 14" polyethylene bags filled with a mixture of 2:1 ratio of soil and sand. After transplanting, the seedlings were maintained under the shade (nipa shelter) for three weeks and were then transferred under a single layer nylon mesh (2300 foot candles light intensity). The rest of the seedlings were transferred under three layers of nylon mesh (light intensity was reduced to 50%). The height of the shade was approximately six feet from the ground. Seedlings were arranged in a randomized complete block design (RCBD) in three replications.

Results of the experiment showed that significantly thinner leaves were obtained under conditions where the light intensity was reduced to 50%. Plant

height, internode length, stem diameter, leaf number, and number of branches were not significantly affected by light intensity. Petiole length and leaf size on the other hand, were significantly longer and bigger, respectively, when the seedlings were grown under conditions where the light intensity was greatly reduced.