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RESEARCH

Abstract

The Japanese Descendants and the Highland Integrated Rural Development Project (HIRDP) in La Trinidad §

By
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Within the realm of Philippine-Japan relation is an angle of interaction between the Benguet people and the Japanese in the Cordillera. At present, Benguet-Japan relations are intensified by partnership projects and cultural exchange programs, which are all commendatory in attaining the development thrusts of the cordillera Administrative Region (CAR). In view of this, this paper maintains that the dynamics of bilateral relations between the Cordillera and Japan should not be purely viewed in terms of material gains and monetary basis. The study upholds that complimentary to the importance of the official development assistance extended in the Cordillera, specifically the province of Benguet, is the merit of cherishing human relations. One of the hallmarks of Benguet-Japan relations is the Japan International Cooperation Agency-assisted Highland Integrated Rural Development Project (HIRDP) used in this study to showcase the multifaceted relations between Benguet and Japan.

In this work, the Benguet-Japan partnership, together with the ensuing development of Benguet, was analyzed based on Ferrer's social development cum *sitz im leben* (stimulus-action) framework. The study inquired about the circumstances surrounding Japanese emigration to Benguet, the role of Sr. Theresia Unno, the participation of the Japanese descendants and other entities involved in the conceptualization of HIRDP as well as the socio-cultural contributions of the project to the development of Benguet among others.

Utilizing the historico-descriptive approach, it was found that Benguet-Japan relations were founded on past habitation, which blossomed with the construction of the Benguet road in 1903. These reciprocal relations were corrupted when Japan assailed its neighbors to suit its expansionist motives. Expatriated back to Japan, the families of Japanese immigrant workers were left behind; hence, the existence of Japanese descendants in La Trinidad, Benguet. These families suffer ostracism as a consequence of the inhumanity of the Japanese forces. Benguet-Japan relations were restored when Japan maximized its financial powers to invest in development undertakings assisting less developed countries like the Philippines. In Benguet, mutual understanding was revived when the sphere of Japan's influence encompassed cultural exchange programs, technical cooperation projects, and sisterhood ties, which are all imperative to nation building and world peace.

The conceptualization of the HIRDP was traced to a number of underlying factors, which included insufficient agricultural and social development assistance, poor and unclean irrigation, lack of clean domestic water, sewage problems, poor or absence of farm-to-market roads, and financial incapacity of the province. All of which, were impediments to the development of La Trinidad as an agricultural community. Disregarding indifferences over a boundary conflict, the Mountain State Agricultural College and the Local Government Unit of La Trinidad reconciled to address the perennial problem.

Although the revised HIRDP proposal mentioned the existence of the Japanese descendants in the project area to draw the attention of the Japanese Government (GOJ), this study found no direct and concrete evidence that the granting of the project was attributed this. However, in cognizance of the instrumental activities of the Japanese immigrants and their descendants in forging and strengthening ties

between Japan and the countries where they reside, the Japanese government passed a law in 1986 to extend help in terms of livelihood and other forms of amelioration to Japanese descendants, especially in the Third World countries. This was the same year when the HIRDP proposal was formally considered as one of the top ten priorities for a grant. Incorporated in JICA's assistance program was the enlivening of the communities where Japanese immigrants and descendants dwell. This included the establishment of agricultural experiment stations, the creation and maintenance of facilities and aid to help emigrants and the Japanese descendants establish themselves.

On the approval of the HIRDP, the agricultural importance of La Trinidad, Benguet as a major producer of temperate vegetables in the Philippines complemented the policy of the GOJ to alleviate poverty and hasten food production through agricultural development. The policy of Japan on sustainable development was also in support to the Medium Term Development Program (MTDP) of the Aquino administration. Also, the HIRDP would have not been actualized without the tenacity of the Provincial Government of Benguet, in cooperation with concerned local government units and the National Economic Development Authority. As channels of development, the PGB and the LGU maintained the needed level of working relations essential in earning the trust of the donor country.

The groundwork preparation of the HIRDP was a concerted effort among the LGU of La Trinidad, MSAC, and Sr. Theresia Unno's group. The proposal embodied the vision of the LGU and MSAC to develop La Trinidad into a vegetable land of Southeast Asia and an exhibit Mecca of modern farm integrated operation for local and international visitors. However, the participation of farmer beneficiaries in problem identification was a determinant in the finalization of the HIRDP project components.

The mediating influence of Sr. Unno fast tracked the endorsement as well as the eventual implementation of the HIRDP. The existence of the Japanese descendants was vivified by Sr. Unno, whose ability to muster a solid support for the realization of the HIRDP appropriated her mission to stabilize the living conditions of the Japanese descendants and the farmer of La Trinidad.

Another angle which is not directly related but considerably important in realizing cooperation projects, i.e., the HIRDP, was the official sisterhood agreement forged between the Kochi Prefecture and the Province of Benguet in 1975. Affirmed in the declaration of sisterhood was the inter-government scheme to step up agricultural development. The latest sisterhood agreement La Trinidad entered into was with Satomi Mura, Ibaraki Prefecture. All of the foregoing sisterhood ties seek to advance mutual understanding towards world peace and encompass the facilitation of smooth actualization of technical cooperation projects for development.

Reinforcing the openness of the local government of La Trinidad in reciprocating Japanese-assisted projects and sisterhood ties had been Sr. Unno's community works, which also became a stepping stone toward the binding of Baguio City Lion's Club and the Ueda City Lion's Club. In her own private capacity, Sr. Unno facilitated the restoration of Japan-Benguet relations while involved in community concerns in La Trinidad. To date, the Filipino-Japanese Foundation of Northern Luzon founded by Sr. Theresia Unno, which is now being managed by the Japanese descendants of the Japanese immigrant workers, functions as a channel for promoting Philippine-Japan relations through its projects and program activities.

The socio-cultural contributions of HIRDP to the community of La Trinidad included the strengthening of Benguet-Japan relations, which culminated with the forging of sisterhood agreement between Niisato Mura, Iwate Prefecture and La Trinidad, Benguet on 1992. The Local government of La Trinidad, since then, adopted the concept of "clustering communities", wherein the resources of one barangay are maximized to benefit neighboring barangays. The HIRDP did not only hasten production, but also increased economic gains of the community. It made barangays Bahong and Ambiong tourist spots, because of their blooming cut flower production. The HIRDP enlivened La Trinidad as a farming community. Farmers' Organizations and Irrigators' Associations were organized if not strengthened in all barangay-beneficiaries. Moreover, the farmers learned new skills in terms of maintaining agricultural facilities and farming techniques.

Conclusions of this study affirm that (1) HIRDP resulted from the influence of various factors including the dynamic relationship and persistence of certain institutions and personalities, (2) HIRDP has contributed to the enhancement and progress of farmers and Japanese descendants in Benguet, particularly La Trinidad where it is located, and (3) the social development cum *sitz im leben* framework is an effective tool for a better understanding of Benguet-Japan relations and the development trajectory of La Trinidad.

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Status of the Fruit Processing Industry in Mountain Province §

By
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The study aimed to determine the status of the fruit processing industry, the reasons of the fruit processors in engaging in the industry, market and marketing practices, and the problems encountered as well as the solutions made by the respondents. The respondents were 63 fruit processors of the province for at least three years.

Findings show that the resources available are manpower, fruit supplies, miscellaneous that includes fuels, delivery services, and working capital. The respondents have a medium level of knowledge and skills on wine making and persimmon preservation. The available technology supports are technical assistance, market supports and financial supports. The available technical assistance include home visits and demonstration. Regular market days in some localities in the province and ready market are the available market supports. Having credit or bartering of products is the available financial support.

The leading reasons of the processors in engaging in the industry are—processed fruits have longer shelf life and higher price, simplicity of the technology, willingness of storeowners to give credit, and the continuing education on fruit processing.

Direct marketing of processed fruits within the barangay is highly practiced. The mode of payments such as cash, cash on delivery, installment, and credit are moderately practiced.

The industry contributes moderately to production, and income and employment generation in the province. Contributing moderately to production are the longer shelf life of processed fruits and production of new kind of products. Fruit processing as alternative source of income and the conversion of waste materials to cash are the moderate contribution of the fruit processing industry to income. Employed family members on part-time basis and additional hired manpower on per hour or contract basis moderately contribute to employment generation.

The very serious problem encountered by the respondents is high interest loan.

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Impact of the Technology Transfer Classes of Mountain Province State Polytechnic College §

By
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The study was conducted to determine the impact of the vocational and livelihood skills trainings to its clientele as implemented through the Technology Transfer Classes (TTC) program of Mountain Province State Polytechnic College (MPSPC) from School Year 1999-2000 to School Year 2003-2004. More specifically, the study aimed to (1) characterize the profile of the respondents, (2) determine the strategies and status of the TTC Program of MPSPC, (3) determine the status of adoption of the vocational and livelihood skills trainings, (4) determine the impact of the vocational and livelihood skills trainings to its clientele, and (5) determine the degree of seriousness of problems encountered in the implementation/adoption of the vocational and livelihood skills trainings.

The study was conducted within the service area of MPSPC in Mountain Province. Two sets of questionnaires were used and distributed to the two sets of respondents; the graduate-respondents and officer/trainer-respondents.

The salient findings of this study are:

1. The profile of the respondents are the following:
 - a. greatest number of respondents have an age range of 26 to 35 years with a mean age of 38 years
 - b. majority are females
 - c. Half of the officer/trainer-respondents finished their M.A./M.S. specializing in Food Processing and Baking with 10 to 20 years teaching experience. The Greatest number of the graduate-respondents are college graduates and attended trainings in practical electricity, swine and livestock production, and garment trades.
2. The status of the TTC program and its implementing strategies are:
 - a. The vocational and livelihood skills trainings offered through TTC for the last five years were: Practical Electricity, Food Processing and Baking, Garment Trades, and Swine and Livestock Production. These had the least extent of implementation with an average completion rate of 87.43 percent.
 - b. Both groups of respondents perceived the level of effectiveness of the strategies as effective: "Hands-on" participatory classroom and field activities, and combination of at least two methods.
 - c. Both groups of respondents regarded the level of attainment of the objectives of the TTC program as attained with an average mean of 3.568 and 3.547 for graduate- and officer/trainer-respondent, respectively.
3. Most of the graduate-respondents adopted the skills acquired from TTC program with moderate level of adoption with a majority employing their skills in small-scale production for the extent of adoption. Majority of the graduate-respondents adopted the skills for five years or more with only a few for 3 to 4 years after the training.
4. The impact of the vocational and livelihood skills trainings to the clientele are:
 - a. Almost half or 48.72 percent of the clientele considered a very high extent of change in their competency level in terms of knowledge, skills, and attitudes.
 - b. The main source of income of the clientele is through self-employment followed by regular employment in the Department of Education Culture and Sports and on part-time/on-call basis.
 - c. There is a positive change in their income after the adoption of skills according to the graduate-respondents.
 - d. A great majority claimed no change in employment generation after the adoption of skills.
5. The degree of seriousness of problems encountered in the implementation or adoption of the skills trainings are:
 - a. Both groups of respondents considered the problems encountered from within the implementing agency as serious.
 - b. Both groups of respondents claimed that the problems encountered from within the clientele, with the produce or output, and within the environment is moderately serious.

Based on the findings of the study, the following conclusions were drawn:

1. Vocational and livelihood skills trainings for females help improve their standard of living not only economically, but also socially and education-wise. Moreover, the skills acquired enhance their qualification in attaining gainful employment.
2. The strategies used by trainers affect the rate of adoption of skills acquired by the clientele as well as the attainment of the TTC program's goals and objectives.
3. The skills trainings are being adopted, applied, and sustained by clientele to help them be more productive and improve their living standard.
4. There are positive changes in income, knowledge, and skills and attitudes of the clientele due to the skills acquired. Hence, the positive impact on the TTC program's clientele.
5. Problems encountered affect not only the implementation but also the adoption of the knowledge, skills, and attitudes acquired by the TTC program's clientele.

In the light of the findings and conclusions, the recommendations are as follows:

1. More trainings should be given to females, most especially the housewives and out-of-school youths. In addition, there should be widespread information dissemination to encourage more enrollees and trainers to participate in the TTC program.
2. More trainer's trainings should be attended by trainers to learn recent innovations and improvements in methods and strategies in teaching.
3. Possible market of products should be studied and provided for the clientele. Cooperatives and other lending institutions should provide financial support to the would-be entrepreneurs for them to have resources and capital to start a gainful endeavor; because, lack of resources and capital are the main reasons of clientele for not adopting the acquired KSA through the program.
4. More livelihood and vocational skills trainings should be offered by MPSPC as well as by other agencies to empower the people and help improve their way of living.
5. Agencies concerned must provide the necessary assistance to solve the problems encountered in the implementation as well as in the adoption of the skills taught and learned by the trainers and clientele, respectively. This is to attain the main objective of the program that is to help improve the quality of living of the people.

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Full Paper

Sexual Propagation of Bugnay [*Antidesma bunius* (L.) Spreng] as Affected by the Color of Ripe Fruit and Pre-Emergence Techniques †

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Keywords: bugnay, pre-emergence technique, pre-emergence period, mean daily emergence, percent emergence, emergence peak value, emergence value, emergence energy, percent survival

ABSTRACT

The focus of the study was to sexually propagate bugnay [*Antidesma bunius* (L.) Spreng] as affected by the color of ripe fruit and pre-emergence techniques. Specifically the study aimed to (1) compare the propagation performance of bugnay as affected by the color of ripe fruits, (2) determine the best color of ripe fruit for propagation, (3) observe the propagation performance of bugnay under different pre-germination techniques, (4) identify the best pre-germination techniques for sexual propagation of bugnay, (5) determine the interaction effect between the color of ripe fruits and pre-germination techniques, (6) identify the best combination of color of ripe fruit and pre-germination techniques for direct seeding; and (7) produce direct seeded bugnay seedlings for asexual propagation study to produce early fruit-bearing plant stocks.

Findings show that red fruits gave highly significant means than violet fruits on the mean daily emergence, percent emergence, and emergence energy. The red fruits have shorter pre-emergence period, higher emergence peak value, and lower percent survival than violet fruits; but, the differences between their means were not significant.

As to the pre-germination techniques, direct seed extraction gave a highly significant difference in means for the pre-emergence period, mean daily emergence, percent emergence, emergence value, emergence energy, and percent survival, while overnight chilling of the fruit did not. There were no significant differences in the means of the pre-germination techniques and emergence peak values. One minute boiling of the fruits resulted to zero emergence.

A highly significant interaction between the color of ripe fruits and the pre-germination techniques was noted in the mean daily emergence, percent emergence, emergence value, and emergence energy. The interaction between the color of ripe fruits and the pre-germination techniques was not significant in the pre-emergence period, emergence peak value, and percent survival.

INTRODUCTION

This study was conceptualized to support the vision of making Philippine fruits become a regular commodity in the shelves of the global market. It is also anchored with the vision of making Mountain Province the eco-tourist destination and fruit basket of Northern Luzon.

The fruit wine industry in Mountain Province is a promising venture. In 2004, the Department of Trade and Industry in Mountain Province showed that there are 38 registered food processors in the province. Most of these were engaged in the fruit wine industry using bugnay fruits [*Antidesma bunius* (L.) Spreng] as raw material. The fruit of bugnay is utilize,

because it is very cheap especially during the peak season. The fruits can be bought at a low price or could be given free of charge.

However, not even a small scale plantation of bugnay is visible in the province. Wine makers in the province buy the fruits from nearby localities, municipalities, provinces, and even regions in order to sustain the bugnay fruit wine industry. Production of sustainable, early fruit-bearing plant stocks of bugnay needs to be addressed before the prospering fruit wine industry of the province go into extinction.

Direct seeding is one of the methods of propagating bugnay. This involves the use of seedling as planting stock. Di-

rect seeded seedlings have better root development; because of the presence of the primary roots. This ensures the plant stronger anchorage to the soil, better water and nutrient uptake, and bigger trees compared to most asexually propagated trees. However, direct seeded bugnay trees usually take seven or more years to bear fruits.

Likewise, direct seeding propagation of bugnay requires skill. It is in this context that this study was undertaken.

Nature and Importance of the Study

Farmers' experiences and observations show that bugnay seeds germinate after a year from sowing, making most farmers lose interest to propagate this crop through direct seeding.

Various practices had been tried in the attempt to shorten the germination period of bugnay.

In determining the best method of hastening germination of bugnay, nurserymen and researchers are encouraged to generate a technology for its large scale propagation or establish a plantation through direct seeding method; hence, the study was proposed.

Objectives of the Study

The focused of this study was to determine the propagation performance of bugnay [*Antidesma bunius* (L.) Spreng] as affected by the color of ripe fruits and pre-germination techniques.

Specifically the study aimed to:

1. compare the propagation performance of bugnay as affected by the color of ripe fruits
2. determine the best color of ripe fruit for propagation
3. observe the propagation performance of bugnay under different pre-germination techniques
4. identify the best pre-germination techniques for sexual propagation of bugnay
5. determine the interaction effect between the color of ripe fruits and pre-germination techniques
6. identify the best combination of color of ripe fruits and pre-germination techniques for direct seeding, and
7. produce direct seeded seedlings of bugnay for asexual propagation study to produce early fruit-bearing plant stocks

Time and Place of the Study

The study was conducted under open condition from July to December 2007 at the Poblacion, Tadian, Mountain Province.

The area has two (2) pronounced seasons; dry from November to April and wet the rest of the year. Heavy rainfalls are usually registered during the months of June, July, August and September. The temperature in December, January and February is the coolest, and in April and May, the hottest.

MATERIALS AND METHODS

Good looking, disease-free, and pest damage-free bugnay fruits were collected from a tree. The ripe bugnay fruits were segregated based on color, and pre-germination techniques employed.

The ripe fruits used and assigned as factors according to color is as follows:

F₁ – red, the whole fruit is dominantly red

F₂ – violet, the whole fruit is dominantly violet

The treatments were the pre-germination techniques as follows:

T₁ – direct, the seeds were directly extracted before sowing

T₂ – one-minute boiling, the fruits were boiled in tap water with a temperature of 98-100°C for one minute before seed extraction

T₃ – overnight-chilling, the fruits were chilled in a refrigerator with a temperature range of 8-10 °C

Fruits subjected to one minute boiling (T₂) and (T₃) overnight chilling are commonly practiced by farmers in the province. These techniques are associated with juice extraction in fruit wine making. Prior to sowing, seeds were tested for viability employing floatation method. Seeds floated were rejected.

One hundred fifty viable seeds per treatment per replication were sown on July 8, 2007 in a 6" x 12" styrofoam containing fine river sand and compost. Styrofoams were arranged accordingly, follow-

ing the factorial completely randomized design (CRD-factorial) under open field condition (Figure 1). The draw lots system was used to assign treatments for each replication in the layout.

To hasten germination, each styrofoam sown with seeds were placed in an air-sealed transparent plastic bags for a month, with regular monitoring of sufficient moisture availability.

All the cultural management requirement of bugnay were equally implemented in all treatments.

Data Gathered

The number of seeds that emerged was assessed and recorded from the start of emergence on November 15, 2007 until December 30, 2007 or one and a half month after the first emergence. The data gathered were the following:

1. Pre-emergence period. This was determined by recording the number of days from sowing to first emergence. The date of sowing was on July 8, 2007 and the first emergence was noted on November 15, 2007. The first emergence varies.
2. Mean daily emergence. Daily germination of seed per treatment per replication was recorded. The mean was determined by taking the sum of daily germination percentage or cumulative germination percentage divided by the number of days when germination completed from start of germination to last day.
3. Percent emergence. This is the total number of seeds emerged over the total number of seed sown multiplied by 100.

Figure 1. Field layout

Replication 1	Replication 11	Replication 111
F ₁ T ₂	F ₂ T ₂	F ₁ T ₂
F ₁ T ₁	F ₂ T ₁	F ₁ T ₁
F ₁ T ₃	F ₂ T ₃	F ₁ T ₃
F ₂ T ₂	F ₂ T ₁	F ₁ T ₃
F ₂ T ₃	F ₂ T ₃	F ₁ T ₂
F ₂ T ₁	F ₂ T ₂	F ₁ T ₁

4. Emergence peak value. This was determined by recording the daily number of emerged seeds. The day with the highest emergence was considered to have the emergence peak value. Emergence peak value refers to the maximum mean daily emergence reached at any time during the period of the test.
5. Emergence value. This was determined by multiplying the mean daily emergence and emergence peak value.
6. Emergence energy. This was determined by considering the percentage of seeds that emerged within a specified period, that is—the percentage of seeds in samples that emerged up to the time when the number of emerging seeds per day reached its peak.
7. Percent survival. This is the total number of seeds that survived from first emergence on November 15, 2007 to December 30, 2007 divided by the total number of seeds sown and multiplied by 100.

RESULTS AND DISCUSSION

Pre-Emergence Period

The pre-emergence period as affected by the color of ripe fruits and pre-germination techniques is revealed in Table 1. The slight difference between the means is not significant having a computed F-value of 0.71. This means that the pre-emergence period was not affected by the color of ripe fruits.

Direct seed extraction had the earliest pre-emergence period while overnight chilling of fruits before seed extraction had the latest. Seeds of fruits subjected to one-minute boiling before seed extraction did not germinate. Statistical analysis showed a highly significant difference among the means. This result means that pre-emergence period is highly affected by pre-germination techniques used.

The interaction effect between the color of ripe fruits and the pre-germination

techniques on pre-emergence period is not significant with a computed F-value of 0.43.

Mean Daily Emergence

Table 2 presents the mean daily emergence as affected by the color of ripe fruits and pre-germination techniques.

Red fruits gave a higher mean compared to the violet fruits. The means have a highly significant difference, which implies that color of ripe fruits greatly affected the mean daily germination of bugnaya.

The difference between the means of pre-germination techniques is highly significant. This means that the pre-germination techniques affected the mean daily emergence.

There is a highly significant interaction between the color of fruits and the

Table 1. Pre-emergence period

Treatment	Mean Raw Data	Mean Transformed
Color of Ripe Bugnaya (A)		
Red	146.50	8.32
Violet	150.50	8.43
Pre-germination Techniques (B)		
Direct seed extraction	147.67	8.32
One-minute boiling	0.00	0.71
Overnight-chilling	155	12.47
A x B, interaction		0.43ns
cv = 3.16%		ns – not significant

Table 2. Mean daily emergence

Treatment	Mean Raw Data	Mean Transformed
Color of Ripe Bugnaya (A)		
Red	55.33	5.41
Violet	21.66	3.68
Pre-germination Techniques (B)		
Direct seed extraction	50.00	7.26
One-minute boiling	0.00	0.71
Overnight-chilling	27.00	5.22
A x B, interaction		9.18**
cv = 16.15%		** - highly significant

pre-germination techniques on mean daily emergence of bugnay.

Percent Emergence

The percent emergence as affected by the color of ripe fruits and pre-germination techniques is presented in Table 3.

Red bugnay fruits registered higher percent emergence than violet bugnay fruits. Statistical analysis showed a highly significant difference between their means. This means that the color of ripe fruits greatly affected the percent emergence of bugnay.

Similarly, pre-germination techniques highly affected the percent emergence of bugnay (Table 3; Plates 1 and 2). Mean differences show a highly significant difference. Thus, percent emergence of

bugnay is highly affected by pre-germination techniques.

Moreover, a highly significant interaction was noted between the color of ripe fruits and the pre-germination techniques on percent emergence.

Emergence Peak Value

Red bugnay fruits registered higher emergence peak value than violet bugnay fruits (Table 4). Yet, the difference between the two means is not significant. This means that emergence peak value was not affected by color of bugnay fruits.

It can also be noted from the table that emergence peak value varied with the pre-germination techniques.

Statistical analysis revealed no significant differences on the emergence

peak value, pre-germination techniques, and the interaction effect between them. This means that the emergence peak value of bugnay was not affected by the color of ripe fruits and pre-germination techniques.

Emergence Value

Table 5 shows that fruit color can greatly affect the emergence value of bugnay as indicated by a significantly higher mean.

Moreover, pre-germination techniques greatly influence the emergence value of bugnay resulting to a highly significant difference in means.

Likewise, a highly significant interaction between the color of fruits and the pre-germination techniques was noted in the emergence value.

Table 3. Percent emergence

Treatment	Mean Raw Data	Mean Transformed
Color of Ripe Bugnay (A)		
Red	55.32	5.16
Violet	21.72	3.28
Pre-germination Techniques (B)		
Direct seed extraction	50.05	6.95
One-minute boiling	0.00	0.71
Overnight-chilling	22.00	5.0
A x B, interaction		9.9**

cv = 14.99%

** - highly significant



Plate 1. Percent emergence as affected by direct seed extraction technique



Plate 2. Percent emergence as affected by direct seed extraction technique

Table 4. Emergence peak value

Treatment	Mean Raw Data	Mean Transformed
Color of Ripe Bugnay (A)		
Red	0.42	0.99
Violet	0.31	0.92
Pre-germination Techniques (B)		
Direct seed extraction	0.40	1.11
One-minute boiling	0.00	0.71
Overnight-chilling	0.33	1.04
A x B, interaction		0.83ns
cv = 16.15%	ns – not significant	

Table 5. Emergence value

Treatment	Mean Raw Data	Mean Transformed
Color of Ripe Bugnay (A)		
Red	0.39	0.83
Violet	0.16	0.74
Pre-germination Techniques (B)		
Direct seed extraction	0.36	0.86
One-minute boiling	0.00	0.71
Overnight-chilling	0.20	0.78
A x B, interaction		18.0**
cv = 5.23%	** - highly significant	

Emergence Energy

Table 6 further shows that color of fruits highly affected the emergence value of bugnay; and, pre-germination techniques greatly affected emergence energy.

Hence, a highly significant interaction between the color of the fruit and the pre-germination techniques on the emergence energy was noted.

Percent Survival

There was a slight difference observed on the percent survival between red and violet bugnay fruits, but is not significant (Table 7). This finding means that percent survival was not affected by the color of ripe fruits.

The same table reveals that percent survival was likewise not affected by

pre-germination techniques; albeit, one-minute boiling gave zero survival rate.

Not surprisingly, a not significant interaction between the color of ripe fruits and the pre-germination techniques was obtained.

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The focus of the study was to sexually propagate bugnay [*Antidesma bunius* (L.) Spreng] and observe how this is affected by the color of the fruits and the pre-germination techniques used. The specific aims of the study were to compare the emergence performance of bugnay, determine the best color of fruits for germination, identify the best pre-germination technique for direct seeding, determine the

interaction effect between the color of the fruits and the pre-germination techniques, and to produce direct seeded seedlings for further study on asexual propagation to produce early fruit-bearing plant stocks.

The salient findings of the study are:

1. The color of the ripe fruits significantly affected the mean daily emergence, percent emergence, emergence value, and emergence energy of bugnay but not the pre-emergence period, emergence peak value, and percent survival.
2. Red fruits have better emergence performance than violet fruits.
3. Parameters such as pre-emergence period, mean daily emergence, percent emergence, emergence value, emergence energy, and percent survival

Table 6. Emergence energy

Treatment	Mean Raw Data	Mean Transformed
Color of Ripe Bugnay (A)		
Red	60.22	5.66
Violet	35.33	3.68
Pre-germination Techniques (B)		
Direct seed extraction	44.08	6.98
One-minute boiling	00.00	0.71
Overnight-chilling	42.44	1.82
A x B, interaction		11.45**

cv = 24.41%

** - highly significant interaction

Table 7. Percent survival

Treatment	Mean Raw Data	Mean Transformed
Color of Ripe Bugnay (A)		
Red	97.43	7.10
Violet	96.74	7.12
Pre-germination Techniques (B)		
Direct seed extraction	97.91	10.32
one-minute boiling	00.00	0.71
Overnight-chilling	96.26	10.31
A x B, interaction		1.30ns

cv = 5.45%

ns - not significant

- were significantly affected by the pre-emergence techniques. Only the emergence peak value was not affected by the pre-emergence techniques.
- There were significant interaction between the color of the fruits and pre-emergence techniques on mean daily emergence, percent emergence, emergence value, and emergence energy. No interaction effect was observed on pre-emergence period, emergence peak value and percent survival.
 - There were direct seeded seedlings produced for asexual propagation studies.
 - Pre-emergence techniques affect pre-emergence period, mean daily emergence, percent emergence, emergence value, emergence energy, and percent survival. They do not affect emergence peak value.
 - Direct seed extraction is better than overnight chilling and one minute boiling.
 - There are significant interaction effects between the color of fruits and pre-emergence techniques.
 - Using red fruits and direct seed extraction together is better than the other combinations.
 - Direct seed extraction is the recommended pre-emergence technique for bugnay.
 - Red fruits and direct seed extraction combination should be used for sexual propagation of bugnay.

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Conclusions

Based on the findings, the following conclusions were drawn:

- Red and violet bugnay fruits can be sexually propagated for direct seeding.
- Red fruits have better emergence than violet fruits.

Recommendations

In the light of the foregoing findings and conclusions, the following recommendations are proposed.

- Red fruits of bugnay are recommended for sexual propagation.

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Comments and Contributions:

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