THEY STAND AMONG EQUALS: SPATIAL DISTRIBUTION PATTERNS OF NEW BIOTYPES OF WEEDY RICE (*Oryza sativa* L.) IN MALAYSIA

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ABSTRACT. Weedy rice generally includes all the species of genus *Oryza* mimicking commercial rice crops, but with distinct grain-shattering trait with the ability to disseminate their grains before rice harvests, and their continuous infestation reduces yields and quality of rice crops. In Malaysia, weed rice accessions (*Oryza sativa* complex) is one of the most serious threats to rice production. These weedy rice biotypes or accessions in Malaysian rice granaries usually grow distinctly taller than cultivated rice, and can be easily identified. Since 2005, new biotype accessions have since evolved mimicking closely in morphology such as plant height, and grain colours, thus “standing as equals” with that of cultivated rices like MR84, MR 219, MR220 and MR235. A series of surveys was conducted in 2006-2007 in the rice granaries of Selangor North-West Project, Tanjung Karang, Selangor, Malaysia to assess the populations of these new biotypes or accessions and their spatio-temporal patterns of distribution based on selected quantitative dispersion indices, *viz.* importance value index, variance-to-mean ratio (Vmr), Lloyd’s mean crowding index (m*) and Lloyd’s patchiness (Ip) index. Sixteen morphologically different weedy rice accessions or new biotypes of weedy rice (NBWR) were identified using keys of identification (grain shattering percentage, pericarp colour, awn existence, panicle type and seed size). These NBWRs display opened or closed panicles, >50% or <50% of grain shattering, red or white pericarp colour, awned or awnless grains, and short or long grains. The Acc 8 of NBWR was the most dominant accession compared with other NBWRs based on importance value index throughout the 2006/2007 seasons. The variance-to-mean ratio (Vmr) values showed that all NBWRs aggregated distribution pattern except for Acc 9 and Acc 11 which displayed regular distribution pattern. The values of Lloyd’s patchiness (Ip) index were tested for deviation from unity. Most NBWRs showed aggregated distribution patterns based on Ip values, and Acc 9 and Acc 11 showed a regular distributions. It is believed that a close relationship between weedy rice and cultivated commercial varieties prevails, giving a strong indication that evolutionary forces are still operating in the rice ecosystems. These NBWRs are believed to have evolved from cultivated rice as parents over the years and are believed to be derived from hybridization between different cultivars, selection of weedy traits present in cultivars, relics of abandoned cultivars, or to have been brought into the growing region through contaminated seed stocks.

Keywords: Weedy rices, *Oryza sativa*, quantitative and dispersion indices.
INTRODUCTION
Melastroma malabathricum is a widespread species in many countries throughout the world, including the Philippines, Indonesia, and Malaysia. The species has been reported in various habitats, including wetlands, mangroves, and coastal forests.

METHODS AND MATERIALS
The study was conducted in one hundred young seedlings of Melastroma malabathricum collected from the campus of the University of Malaya, Kuala Lumpur, Malaysia, in March 2010. The seedlings were grown in pots under controlled conditions in a glasshouse.

The hypothesis of the effect of circular versus linear correlation was tested using a linear regression analysis. The correlation coefficient (r) was calculated using the formula:

\[ r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{(n\sum x^2 - (\sum x)^2)(n\sum y^2 - (\sum y)^2)}} \]

where, \( n \) is the number of observations, and \( x \) and \( y \) are the values for each observation.

RESULTS
The results showed a significant positive correlation between the linear and circular correlation coefficients (r = 0.98). This indicates that there is a strong linear relationship between the two variables.

DISCUSSION
The results are consistent with previous studies that have shown a strong linear relationship between linear and circular correlation coefficients. The linear correlation coefficient is generally used when the relationship between the variables is expected to be linear, while the circular correlation coefficient is used when the relationship is expected to be circular.

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REFERENCES


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INTRODUCTION

Vastly population increases have been reported in many paddy fields in the world where the crop is directly sown (Panbury & Yang 2002, Ams & Eber 2003, Mortimer et al. 2000). In 1984, white rice in Malaysia was first observed in Selangor, Johor and later spread to rice fields in Perak Province (Fay & Tan 2003). It is one of the most serious threats to paddy field and rice production in Malaysia. Its early growth and early grain shedding has been the most unwanted traits of white rice. White rice is a major threat in Malaysia usually grows taller than cultivated rice and easily infected. The cultivation practices of direct sowing and volunteer seeding in 1980's are suspected to be the most possible causes for the spread and spread of white rice in Malaysia (Bani 2000). The intensive use of chemically treated seed rice and usage of farm machines in between generations are also contributing to its problem. The increase in white rice rice production in Malaysia. These NRWVs are very prevalent in the Selangor North-West Project (FPS). Morphologically NRWVs mimic cultivated rice standing as square and NRWVs are white or yellow. These NRWVs give the form of white rice in the stalk long. These NRWVs, the taller white rice accessions, possess common easy grain shedding trait. Games of these new accessions have a red petal free but there are also accessions with white or colourless petals, thereby unmarking the cultivated rice. 

OBJECTIVES

(1) To identify new breeds of white rice (NRWV) in the farm blocks of Selangor’s North-West Project.

(2) To assess spatio-temporal patterns of distribution of NRWV in the farm blocks of Selangor’s North-West Project.

MATERIALS AND METHODS

A series of surveys was conducted in the harvesting season for three consecutive seasons of 2006-2009 in farm blocks at the rice farms of the rice farms of Selangor’s North-West Project (FPS). (Table 1) shows the accessions evaluated and the quantitative traits, rice field, and area planted. In addition, the results are reported in Table 1. Four, 5 and 6 show some of the traits of the new white rice accessions in the farm blocks of FPS. In summary, the NRWVs strain for commercial rice standing and disease resistance. We believe that a relationship between white rice and cultivated commercial varieties prevents, giving a strong indication that evolutionary forces are still operating in the rice ecosystems. These NRWVs should be identified and used as potential sources of new traits in the rice breeding programs. The NRWVs appeared to be a group of accessions that could have been derived from hybridization between different cultivars, selection of weed traits present in cultivars, relieves of abandoned crops, or to have been brought into the growing region through contaminate seed stocks.

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REFERENCES


INTRODUCTION

Malastoma malabathricum (L.) is an often-badly known locally as the Brahma Redshank, is a common pioneer shiver in arid lands, abandoned farmlands, secondary forest openings and drained areas in Malaysia and elsewhere, where it is often associated with evidences of grassland clearing or grazing, disturbances due to overgrazing or habitat degradation, and some evidence of deforestation, agriculture, and the destruction of natural vegetation. Observations on two-dimensional directions are cited in several studies and these are often referred to as "spatial autocorrelation," i.e., the statistical properties of the species. However, this study investigates the spatial patterns of Malastoma malabathricum across different habitats in the study area, with a focus on the relationships between habitat type and the distribution of the species. The study area was selected based on the presence of Malastoma malabathricum and the availability of suitable habitat types.

MATERIALS AND METHODS

Study site and experimental design. The experiment was conducted in an insect-proof house with 12 hours of natural daylight per day, planted with different microclimate conditions, and varied soil temperatures of 10°C (c) and 20°C (e) at Rama, Sisam, Kuala Lumpur, Malaysia (24° 17' N, 101° 52' E). Malaysia. The Malastoma malabathricum was acclimated in May and transferred to six houses, each measuring 30 cm x 40 cm x 40 cm at the density of 100, 50, 25, and 12.5 points per house, with each set replicated. The results were then averaged over the treatment for each set of replicates. The average was calculated for each treatment, and the mean of the averages was used. The data were analyzed using the R (version 3.4.4) statistical software. The data were presented and discussed with the software ORIS and the R Project for statistical computing - Statsoft.

The hypothesis that there is a correlation between a circulative variable (horizontal or vertical rotation angle) and linear variables (mean vector) was tested using a series of linear correlation analysis. The data were analyzed and discussed with the software ORIS and the R Project for statistical computing - Statsoft.

RESULTS AND DISCUSSION

Results and discussion. The Brahma Redshank is a common shiver in arid lands, abandoned farmlands, secondary forest openings and drained areas in Malaysia and elsewhere, where it is often associated with evidences of grassland clearing or grazing, disturbances due to overgrazing or habitat degradation, and some evidence of deforestation, agriculture, and the destruction of natural vegetation. Observations on two-dimensional directions are cited in several studies and these are often referred to as "spatial autocorrelation," i.e., the statistical properties of the species. However, this study investigates the spatial patterns of Malastoma malabathricum across different habitats in the study area, with a focus on the relationships between habitat type and the distribution of the species. The study area was selected based on the presence of Malastoma malabathricum and the availability of suitable habitat types.

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INTRODUCTION

Plant allelopathy may be used as a cultural weed control method in the agro-ecosystems and reduce the perceived hazardous impacts from herbicides and pesticides (Jha et al., 2015). Crop allelopathy may be useful in minimizing serious problems in agricultural production such as environmental pollution, products used, humans health concerns, depletion of crop diversity, soil decay and reduction of crop productivity (Dhawan et al., 2017). Brassica species have been reported to possess allelopathic properties affecting growth of other plant species and reduce seed germination of small-grain crops when they grow in rotation (Dhawan et al., 2019; Turk et al., 2002). Some plants from the Brassicaceae family such as mustard (Brassica juncea) have a high potential to be used in alternative weed management systems (Brown and Morse 1991; Ackerman and Seaver 1992). Mustards have been genetically bred for increased glucosinolate content in seeds and roots. The glucosinolates that produce by the seeds, as an allelochemicals, can control weeds (Brown and Morse 1991; Ackerman and Seaver 1992). However, the yield and quality of Brassica species could be reduced by a small amount of mycorrhizal fungi, making them less useful in the environment (Chen et al., 2008; Bhagat et al., 2012). Rhizopus niger growth.

OBJECTIVES

(a) To assess the allelopathic potential of B. juncea as a natural herbicide

(b) To assess the effects of aqueous extract of root, stem and leaf of B. juncea on seed germination and seedling growth of radish and barnyardgrass

MATERIAL AND METHODS

Plant sampling and preparation The stems of B. juncea (Fig. 1) were harvested at a vegetative stage from an in-house plant house, Institute of Biological Sciences, University of Malaya, Kuala Lumpur, Malaysia. These plants were immediately placed in a bucket of water to remove all soil or other adherent material and subjected to phenotypic and morphological analysis. The seeds were cleaned and dried in furnaces at 60°C. The dried seeds were ground and mixed to ensure a homogenous blend of seeds for the experiment. The mixture was then subjected to glucose concentration of 50 g/l.

RESULTS AND DISCUSSION

Table 1 illustrates the effects of different concentrations of aqueous extract PHE and DME of E. coralloides on rate of seed germination, mean time of four germination, radish growth and barnyardgrass growth. All experiments were conducted in a greenhouse under controlled environmental conditions. The results are presented as means ± standard error. The significance of differences was determined using Tukey's Honestly Significant Difference (HSD) test at a probability level of p<0.05. All experiments were conducted in triplicate.

The results showed that the aqueous extract of E. coralloides at 50 g/l significantly increased the rate of radish and barnyardgrass seed germination compared to the control. The highest increase was observed in radish seed germination. The effect of E. coralloides extract at 50 g/l on radish seed germination was significantly higher than that of 25 g/l. E. coralloides extract at 50 g/l significantly increased the radish root and barnyardgrass shoot growth compared to the control. The highest increase was observed in radish root growth.

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