International Collaborative Conference on Multidisciplinary Science
Volume. 1, Number. 2, Year 2024
Hal. 225-234
Available online at: https://iccms.ifrel.org/index.php/ICCMS

Morphological Characterization of Mango (*Mangifera indica*) in Situbondo

Nurul Avidhah Elhany [1*], Muhammad Thoifur Ibnu Fajar [2], Mohammad Ikbal [3], Miftahur Rahmah [4]
[1,2,3,4]Department of Biology, Abdurachman Saleh Situbondo University, Situbondo, Indonesia.
Email : nurul_avidhah@unars.ac.id [1]*

Abstract. Situbondo is a district in the province of East Java, Indonesia. Situbondo is a mango production center, in 2019, based on BPS East Java data, produced mango fruit reaching 23,511.70 tons. This research is basic research to determine the potential of mangoes as a food diversification and energy diversification product in Situbondo. This research will be able to determine the morphological characterization of mango types in Situbondo region. By knowing the morphological characteristics of each type of mango, it can be determined which types of mango have the potential to be used as food diversification products or energy diversification products. This research was conducted in 17 sub-districts in Situbondo Regency. Characterization of mango fruit from various types of varieties was carried out using the 2006 IPGRI (International Plant Genetic Research Institute) mango series as a reference. 5 different types of mango were found, namely: Gadung mango, Manalagi mango, Arum manis mango, Arum merah mango and Garifta mango. There is a diversity of mango plant morphology found in terms of tree morphology, leaf morphology and fruit morphology. Arum manis mango and Arum merah mango have almost the same characteristics. Gadung mango has the largest tree shape among other mangoes.

Keywords characterization, mango, Situbondo

1. INTRODUCTION

Situbondo is a district in the province of East Java, Indonesia (Wibowo *et al*., 2020). Situbondo Regency has an area of 1,638.50 km² or 163,850 Ha and has an elongated shape from west to east approximately 150 km on the north coast of the Tapal Kuda area, East Java (Afif *et al*., 2022). Situbondo area is divided into 17 sub-districts (Mudhari, 2018). Situbondo sub-district which consists of 17 sub-districts including, Arjasa, Asembagus, Banyuglugur, Banyuputih, Besuki, Bungatan, Jangkar, Jatibanteng, Kapongan, Kendit, Mangaran, Mlandingan, Panarukan, Panji, Situbondo, Suboh and Sumber Malang (Supriyanti, 2020). The natural landscape of the Situbondo region, which consists of 17 sub-districts, has pristine land and sea areas, making the Situbondo region rich in natural resources (Zakiyah *et al*., 2022). The natural wealth of the Situbondo region which has economic value includes vaname shrimp ponds, tobacco, grouper fish, sugar cane and mangoes (Wibisono, 2015). The city of Situbondo is a famous producer of mango fruit commodities (Nurtyara *et al*., 2023). Situbondo mango fruit is known for its sweeter taste so it is popular with many people (Fitranto *et al*., 2020).

The mango plant is an annual plant with seasonal mango fruit harvests (Tunta & Buke, 2023). The roots of the mango plant are taproots that can reach 6 meters in the ground. The height of mango plant stems can reach 10 to 40 meters (Sangpal *et al*., 2023).

Received: October 30, 2024; Revised: November 30, 2024; Accepted: December 26, 2024; Published: December 31, 2024

The shape of the mango plant canopy consists of oblong, round, wide pyramid and semicircular shapes (Fitmawati, 2020). The bark of mango stems is rough, dark gray, brown to black and often cracked or cracked skin inconspicuously (Sangpal *et al*., 2023). The leaves of the mango plant are located alternately (Gamit *et al*., 2018). The forms of leaves can vary and include roundish-oblong, oval-lanceolate, lanceolate, ovate, obovate lanceolate, and oblong (Ibukun & Yomi, 2020). Leaf color varies from light-green to slightly brownish or purplish when plants are young, and acquires a dark green color as it develops and become mature (Vieccelli *et al*., 2016). The fruits of mango plants vary from obovoid, elliptical, round and oblong (Singh & Singh, 2020). The color of mango skin varies, generally consisting of green, orange, yellow, red, purple, a mixture of red-yellow, a mixture of red-green and orange-yellow (Estrada *et al*., 2022). The color of the fleshy fruit of mango varies from orange, yellow orange, orange yellow and yellow (Yusuf *et al*., 2018). The morphology of mango flowers consists of male flowers and double sexual flowers or hermaphrodites (Ramirez & Davenport, 2016). The shape of the mango flower consists of a pyramid shape and a cone shape. The morphological forms of mango flower crowns include semi-circular, pyramidal, oblong, and round (Khadivi *et al*., 2022). The general shape of mango flower petals is oval, ovoid, rectangular and quadrangular with rounded edges (Ledesma *et al*., 2017). The shape of mango seeds consists of an oval shape (elliptical), a kidney-like shape (reniform) and a long and slightly wide flat shape (oblong) (Bhamini *et al*., 2018).

Situbondo Regency, which is a mango production center, in 2019, based on BPS East Java data, produced mango fruit reaching 23,511.70 tons (Firmansyah *et al*., 2022). Generally, environmental factors in the form of lowland to medium land with an altitude of less than 300 meters are suitable for growing mangoes, but they do not grow well in the highlands (Puspita *et al.*, 2021). The Situbondo area is a weathered lowland hot, so it is very suitable for the growth of mango plants and produces quality mango fruit (Muhlis *et al*., 2017). Apart from that, other factors such as climate can influence the growth of mango plants (Triani & Ariffin, 2019). The ideal climate for the growth of mango plants is a slightly dry climate with rainfall of 750 - 2000 mm, with a dry season of four to seven months, an altitude of less than 300 meters and an ambient air temperature ranging from 25^{o}C – 32^{o}C (Suwardike *et al.*, 2018). Apart from the weather and climate factors in Situbondo which support the growth of mango quality, soil fertility factors also influence mango growth (Harhash *et al*., 2022). Good soil for cultivating mango plants is soil with a pH of 5.5-7.0 (Salehin *et al*., 2020). Soils with a pH below 5.5 generally mango farmers

will sprinkle lime with dolomite to increase the soil pH (Correia *et al*., 2018). Mango plant farmers can also apply liming and manure to increase soil pH (Firdaus *et al*., 2023). Then another factor, mango plants need to have a dry season for flowering, fruiting, reducing disease and shedding of flowers or fruit (Iqbal *et al*., 2022).

Mango plants in the Situbondo area are generally planted in government-owned plantations, private community gardens and the yards of every house (Puryantoro & Mayangsari, 2020). The mango plants in the Situbondo area that are generally well known include the arum Manis mango, gadung mango, honey mango, garifta mango, golek mango and manalagi mango (Sanjaya & Rosadi, 2018). Mango is one of the tropical fruits that is popular throughout the world because it tastes delicious and fresh (Bambelele *et al*., 2021). Mango fruit contains a lot of vitamin C which acts as an antioxidant and is effective in dealing with free radicals that can damage cells or tissue, including protecting the lens from oxidative damage caused by radiation (Lebaka *et al*., 2021). Various types of preparations that can be produced from manga fruit raw materials are pree, jam, jelly, fruit juice, fruit syrup, candied fruit, dried sweets, pickles and dodol (Wino & Ambuko, 2021). Apart from fruit, manga seeds can be processed into flour which can be used as raw material for making various types of cakes and staple foods (Anggraini *et al*., 2023). Food is a basic human need and must be met both in quantity and quality. Food security has often been identified with sufficient rice, even though in a balanced nutritional diet, the source of carbohydrates is not only rice (Simelane & Worth, 2020). Indonesia is rich in food sources of carbohydrates, so the shortage of rice can be met with other sources of carbohydrates originating from tubers, non-rice cereals, rhizomes and fruit (Rozi *et al.,* 2023). Food diversification is one suitable solution to overcome food security (Yuniarti *et al.,* 2022).

The problem formulation of this research is to determine the morphological characterization of mango in Situbondo Regency. This research is basic research to determine the potential of mangoes as a food diversification and energy diversification product in Situbondo. One of the reasons for the urgency of this research is the world food supply crisis. With this serious condition, food diversification is one of the things that can be done to overcome this problem. Food diversification aims to explore and increase the supply of various food commodities so that community consumption can be diversified. Diversification is an effort to encourage people to vary the staple foods they consume so they don't focus on just one type. In addition, with diversification, society can also obtain nutrition from more diverse nutritional sources (Rahmanto *et al*., 2021). This research will be able to determine the morphological characterization of mango types in Situbondo

region. By knowing the morphological characteristics of each type of mango, it can be determined which types of mango have the potential to be used as food diversification products or energy diversification products.

2. LITERATURE REVIEW

One of the most popular fruit plants is mango (*Mangifera indica* L.). Mango is one of 62 edible species in the family Anacardiaceae. Mangoes are widely sold in Southeast Asia, including the Philippines, Indonesia, Malaysia and Thailand. Mangoes were cultivated 4000 years ago. Among the most important horticultural crops grown in Indonesia, mango occupies a very important place (Mariana dkk, 2020).

The mango tree is a fruit plant with an annual growth period, namely a tree originating from India. Mango trees then spread to Southeast Asia including Indonesia and Malaysia. The origin of the mango tree is from the Anarcadiaceae family, Mangifera genus, Mangifera indica species. Mangoes grow as trees that have upright, branched stems, thick crowns and green crowns throughout the year. Adult mango trees reach 10-40 m in height. The lifespan of a mango tree reaches 100 years or more. The morphology of a mango tree consists of flowers, leaves, stems and roots. Flowers can produce 2 metabolic products, namely fruit and seeds (plants), which can generatively grow into a new plant (Oktavianto et al., 2015).

Mango trees generally produce three types of shoots: (i) vegetative shoots, which produce only leaves, (ii) generative shoots, which have terminal panicles and (iii) mixed shoots which produce both leaves and flowers in the same segment. Vegetative buds undergo different changes from initial bud growth to leaf maturation. Initially in the elongation green stage (EGL) the shoots are light green. The color becomes reddish after two weeks of bud break initiation. The new leaves soon turn light green again and continue to strengthen plus increased lignification of the cell walls. And the last stage turns to dark green reaching mature green leaves (MGL) (Makhmale et al., 2015).

The composition of the nutritional content of mango fruit depends on the type/variety of mango, the location and climatic conditions of the growing area, and the level of ripeness of the fruit. Mango contains various macro and micro nutritional components. In terms of macronutrients, mangoes contain carbohydrates (16–18%), protein, amino acids, lipids, organic acids and dietary fiber. The meat is a good source of micronutrients and contains elements such as calcium, phosphorus, iron and vitamins

(vitamins C and A). Consuming mango flesh regularly can provide high energy: 60–190 Kcal from 100 g of fresh mango flesh. Apart from the important nutritional elements that have been mentioned, mangoes contain 75–85% water (Lebaka et al., 2021).

Mango trees are fruit trees that have the potential to be developed because of their large genetic diversity. Mango morphology varies greatly in shape, size and color, indicating wide genetic diversity. The differences in morphological characteristics of each type of plant make leaves the basis for classifying each type of plant (Risika, 2015).

Identification is an action through the process of observing, obtaining, studying, recording information and information about someone or something. Generally, identification is an action related to the search for identity, or something else (Nurdin et al., 2022). In biology, identification begins with determining the similarities and differences between two individuals, then concluding whether they are the same or not. Plant identification is the steps for grouping plant identities. Through the identification process, the identity of the plant can be known in classification/taxonomy (Juhriah et al., 2014).

Plants are a very essential part of biodiversity. Plant observation is a vital act for understanding plant taxonomy, and a cornerstone of many fields of research (Azwar et al., 2023).

3. METHODS

This research was conducted in 17 sub-districts in Situbondo Regency. The 17 sub-districts in Situbondo Regency include Arjasa, Asembagus, Banyuglugur, Banyuputih, Besuki, Bungatan, Jangkar, Jatibanteng, Kapongan, Kendit, Mangaran, Mlandingan, Panarukan, Panji, Situbondo, Suboh and Sumber Malang. The research was conducted from Juli-Oktober2024.

The location determination was carried out purposively, based on the consideration that the area is a mango production center and is an area for the distribution of mango cultivars, especially local Situbondo mangoes. The tools used in this research include: a cellphone camera used for documentation, a roll meter used to measure the stem circumference and height of the mango plant, a scale used to measure the weight of the mango fruit sample, a ruler used to measure the length and width of the mango plant's leaves, a bow used to measure plant height using the mathematical formula tan = 45°, a writing tool to write down the data obtained, a color chart is used to differentiate the color of mango plant leaves.

This research was carried out using survey and interview methods with farmers and local residents, where research was carried out by observing activities that were not created by researchers, but were natural phenomena (Sugito, 1995). This method is used to obtain information about the object under study through sample data in the field. In this research, no special treatment is required. To analyze the data, descriptive statistical data is used, namely simplifying the data and organizing the data to obtain an overall picture of the object being observed (Yitnosumarto, 1990). The number of plant owner respondents was 20 people in 17 sub-districts in Situbondo Regency. Characterization of mango fruit from various types of varieties was carried out using the 2006 IPGRI (International Plant Genetic Research Institute) mango series as a reference.

4. RESULTS

The result of this research using the survey method were carried out and recorded in a table per district. A total of 17 district in Situbondo as data in this research are sumbermalang, jatibanteng, banyuglugur, besuki, suboh, mlandingan, bungatan, kendit, panarukan, situbondo, mangaran, panji, kapongan, arjasa, jangkar, asembagus dan banyuputih. Each district has mango population with a varying number of individuals. The type of mangoes recorded in Situbondo district are gadung, manalagi, arum manis, arum merah and garifta.

This research identified five different types of mango, namely gadung mango, manalagi, arum manis, arum merah and garifta. Each type of mango has different morphological characteristics and can be identified through various parameters in tree morphology, leaf morphology and fruit morphology. Parameters observed from tree morphology include canopy shape, canopy diameter, plant height, stem circumference and leaf density. Based on the data in table 1, it can be seen that Gadung mango has the largest tree shape among other mangoes. The highest plant height was obtained from the Gadung mango tree, namely 12.8 m and the lowest plant height was obtained from the Garifta mango tree, namely 4.5 m. Apart from that, the largest trunk circumference was also obtained from the Gadung mango tree, namely 118 cm, while the smallest trunk circumference was obtained from the Garifta mango tree, namely 68 cm.

Table 1. Tree Morphology

No	Observed parameters	Gadung mango	Manalagi mango	Arum manis mango	Arum merah mango	Garifta mango
1	Canopy shape	Rounded	Rounded	Spreading	Spreading	Spreading
2	Canopy diameter	10 m	9 m	9,2 m	8 m	5,5 m
3	Plant height	12,8 m	8,2 m	8,5 m	7,8 m	4,5 m

4	Stem circumference	118 cm	78 cm	80 cm	84 cm	68 cm
5	Leaf density	Medium density	Very High density	High density	High density	Medium density

Table 2. Leaf morphology

No	Observed parameters	Gadung mango	Manalagi mango	Arum manis mango	Arum merah mango	Garifta mango
1	Leaf length	30 cm	24 cm	22 cm	22 cm	20 cm
2	Leaf width	12 cm	7,5 cm	7 cm	8 cm	6 cm
3	Leaf stalk length	5 cm	4 cm	4,5 cm	4,5 cm	4 cm
4	Leaf color	Dark green	Dark green	Bright green	Bright green	Dark green
5	Leaf type	Single	Single	Single	Single	Single
6	Leaf tip shape	Pointed	Pointed	Pointed	Pointed	Pointed
7	Leaf vein type	Pinnate	Pinnate	Pinnate	Pinnate	Pinnate
8	Leaf shape	Lancet	Lancet	Lancet	Lancet	Lancet

Tabel 3. Fruit Morphology

No	**Observed parameters**	**Gadung mango**	**Manalagi mango**	**Arum manis mango**	**Arum merah mango**	**Garifta mango**
1	Fruit shape	Elongated	Oval	Elongated	Elongated	Oval
2	Fruith length	22 cm	15 cm	17 cm	17,5 cm	12,5 cm
3	Fruit diameter	8 cm	7 cm	7 cm	7 cm	6 cm
4	Fruit color	Bright yellow	Golden yellow	Bright yellow	Bright yellow	Golden yellow
5	The color of the skin of ripe fruit	Yellowish green	Dark green	Yellowish green	Orange red	Orange
6	Fruit skin surface texture	Smooth	Quite rough	Smooth	Smooth	Smooth
7	Fruit smell	Not very strong	Fragrant	Very fragrant	Very fragrant	Not very strong
8	Shape of the tip fruit	Sharp pointed	Round blunt	Slightly pointy	Slightly pointy	Round blunt

5. DISCUSSION

The most widely used method for planting manga trees in Situbondo Regency is vegetatively. According to Roslinda et al (2022), vegetative is the propagation of plants using vegetative parts of plants such as roots, stems and leaves to produce new plants that are the same as their parents.

Plants produced through vegetative propagation, such as grafting, have an advantage over other types: The genetic traits of the parent tree can be passed on to the next generation, regardless of conditions. Young plants are plants that grow relatively short or quickly which can be used to improve quality and produce new plants by combining the best characteristics of two or more existing plants. However, the weakness is that there are also ingredients that can infect and will spread throughout the plant after planting. Propagating vegetation is difficult because it requires constant low temperatures and weak roots. Some of the plants that grow in the home yard originate from seeds and then plant them, some of

which develop into new plants that are pleasant in nature and equal in quality and yield. This can occur due to the process of natural hybridization or cross-breeding that occurs in nature and accidentally produces plants with superior quality (Oktavianto et al., 2015).

Apart from planting by cuttings, propagation of mango plants in Situbondo Regency also comes from seeds. Generally, plants originating from seeds cannot be guaranteed uniformity in quality and production due to segregation of the seeds. Even though uniformity is a requirement desired by the market. However, there is also a good side to plants that come from seeds. Plants that grow in the yard from discarded seeds turn out to be new plants that show good characteristics, both in quality and level of production. This can happen due to a natural cross-breeding or hybridization process that occurs in nature, which accidentally produces plants that have better characteristics (Wiryanta, 2001). Furthermore, by looking at the data above on stem and leaf morphology, more specific characteristics can be obtained. shows differences between canopy width, plant height, stem circumference, and branching. These differences are more influenced by plant age and environmental conditions. The older the plant, the higher the plant height and the plant canopy tends to grow wider. The surface of the stem becomes increasingly rough. And the higher the plant canopy, the wider the plant tends to grow, so the plant production is also higher.

6. CONCLUSION

Based on research conducted in 17 sub-districts in Situbondo, 5 different types of mango were found, namely: Gadung mango, Manalagi mango, Arum manis mango, Arum merah mango and Garifta mango. There is a diversity of mango plant morphology found in terms of tree morphology, leaf morphology and fruit morphology. Arum manis mango and Arum merah mango have almost the same characteristics. Gadung mango has the largest tree shape among other mangoes. The highest plant height was obtained from the Gadung mango tree (12.8 m) and the lowest plant height was obtained from the Garifta mango tree (4.5 m).

7. LIMITATION

Mango is a seasonal fruit. Therefore, research on mango fruit should be carried out during the mango season. This research was carried out in July - October, so several mango varieties in Situbondo had not yet grown optimally. Therefore, in this study only a few

types of mangoes could be characterized, because other types of mangoes could not yet be characterized.

8. REFERENCES

Afif, M. N., Swastika, K., Sumarjono, Na'im, M., Pratama, A. R., & Jamil, R. N. (2022). Megalithic culture in Rajekwesi Village Kendit District Situbondo Regency. Jurnal Historica, 6(1), 17-39.

Agustin, S., & Prasetyo, E. (2011). Klasifikasi jenis pohon mangga gadung dan curut berdasarkan tekstur daun. Conference: Seminar Nasional Sistem Informasi Indonesia, 58-64.

Amalia, M. S., Herawati, W., & Yani, E. (2022). Keanekaragaman kultivar mangga (Mangifera indica L.) di kabupaten Tangerang. BioEksakta: Jurnal Ilmiah Biologi Unsoed, 4(2), 91-98.

Anonymous 1. (2023). Produksi buah-buahan jeruk besar, jeruk siam, mangga menurut kabupaten/kota dan jenis tanaman di Provinsi Jawa Timur (kwintal), 2021 dan 2022. Retrieved from https://jatim.bps.go.id/statictable/2023/03/20/2579/.

Chandra, T., & Priyono. (2023). Statistika Deskriptif. Malang: CV Literasi Nusantara Abadi.

Ichsan, M. C., & Suroso, B. (2014). Eksplorasi dan karakterisasi buah spesies kerabat mangga di Situbondo. Agritrop Jurnal Ilmu-Ilmu Pertanian, 12(1), 9-13.

Mudhari, M. A. (2018). Sistem informasi pemetaan kantor pemerintah Kabupaten Situbondo berbasis web. Jurnal Ilmiah Informatika, 3(2), 235-241.

Muhlis, A. (2017). Analisis pendapatan dan efisiensi biaya usaha tani mangga gadung di Desa Bayeman Kecamatan Arjasa Kabupaten Situbondo. Skripsi. Fakultas Pertanian, Universitas Jember.

Oktavianto, Y., Sunaryo, & Suryanto, A. (2015). Karakterisasi tanaman mangga (Mangifera indica L.) cantek, ireng, empok, jempol di Desa Tiron, Kecamatan Banyakan Kabupaten Kediri. Jurnal Produksi Tanaman, 3(2), 91-97.

Puryantoro., Hani, E. S., & Subekti, S. (2018). Manajemen rantai pasok mangga manalagi di Kabupaten Situbondo dengan pendekatan food supply chain networking. Jurnal Mahatani, 1(1), 64-79.

Puspita, S., Abdullah, M., Rahayu, E. S., & Retnoningsih, A. (2021). Variasi karakter agronomi mangga wirasangka di Kabupaten Tegal. Prosiding Semnas Biologi ke-9 Universitas Negeri Semarang, 24-28.

Putu, M. L., Kriswiyanti, E., & Defiani, M. R. (2017). Analisis kekerabatan beberapa tanaman mangga (Mangifera spp.) berdasarkan karakteristik morfologi dan anatomi daun. Jurnal Simbiosis, 5(1), 7-10.

Sanjaya, C. B., & Rosadi, M. I. (2018). Klasifikasi buah mangga berdasarkan tingkat kematangan menggunakan least-squares support vector machine. Jurnal Explore IT, 10(2), 1-13.

Satuhu, S. (2006). Bertanam Mangga dan Pascapanen Mangga. Jakarta: Penerbit Kanisius.

Supriyanti, E. (2020). Disparitas wilayah dan konvergensi pertumbuhan ekonomi di Kabupaten Situbondo: Pendekatan sigma dan beta konvergen. Tesis. Fakultas Ekonomi dan Bisnis, Universitas Jember.

Suryandika, F., Maroeto, Purnamawati, L., Windriyanti, W., Suryaminarsih, P., & Nugrahani, P. (2023). Potensi pengembangan perkebunan mangga berbasis organik di Desa Oro-Oro Ombokulon sebagai strategi adaptasi perubahan iklim. Jurnal Plumula, 11(1), 21-33.

Suwardike, P., Rai, I. N., Dwiyani, R., & Kriswiyanti, E. (2018). Kesesuaian lahan untuk tanaman mangga (Mangifera indica L.) di Buleleng. Agro Bali Agricultural Journal, 1(1), 1-7.

Triani, F., & Ariffin. (2019). Dampak variasi iklim terhadap produktivitas mangga (Mangifera indica) di Kabupaten Indramayu, Jawa Barat. Plantropica Journal of Agricultural Science, 4(1), 49-56.

Wardani, L. A. (2012). Validasi metode analisis dan penentuan kadar vitamin C pada minuman buah kemasan dengan spektrofotometri UV Visible. Skripsi. FMIPA UI, Jakarta.

Wibisono, A. (2015). City branding pariwisata untuk meningkatkan daya saing daerah di Kabupaten Situbondo. Tesis. Fakultas Ekonomi, Universitas Jember.

Wibowo, Y., Mahardika, N. S., & Karmila, L. S. (2020). Prospek pengembangan minapolitan di Kabupaten Situbondo. Jurnal Agroteknologi, 14(1), 78-90.

Widowati, S. N., Richana, P. R., Suarni, & Sarasutha, I. G. P. (2001). Studi potensi dan peningkatan dayaguna sumber pangan di Sulawesi Selatan. Laporan Hasil Penelitian. Puslitbangtan, Bogor.

Zakiyah, U., Mahmudi, M., Darmawan, A., Supriatna, Mulyanto, Kurniawan, A., Sudaryanti, S., & Arsyadi, S. (2022). Peningkatan kesadaran stakeholder melalui sosialisasi ilmiah sumberdaya abiotik di Pantai Blekok, Kabupaten Situbondo, Jawa Timur dalam rangka pengelolaannya sebagai wilayah ekowisata. Journal of Rural and Urban Community Empowerment, 3(2), 54-60.