PROCEEDING

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2016

"The Future of Tropical Horticulture"

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Dr. Awang Maharijaya, SP, M.Si
Dr. Ir. Darda Efendi, M.Si

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Telp. (0251) 8326881; Fax. (0251) 8326881

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FOREWORD

The International Seminar on Tropical Horticulture 2016 was held in IPB International Convention Center, Bogor, Indonesia 28 – 29 November 2016. This seminar was organized by Center of Excellence for Tropical Horticulture Studies (PKHT), Center of Excellence in University (PUI-PT), Bogor Agricultural University (IPB), and supported by an excellent collaboration with International Tropical Fruits Network (TF Net).

We're very glad to know the fact that the seminar displayed a very wide discussion about tropical horticulture with delegates from 5 countries (Taiwan, Thailand, Malaysia, Japan and Indonesia) as keynote speech and participants. 24 papers were selected to be included in this proceeding from 28 oral and 31 poster presentation.

This proceeding is contained of three sub chapter, that is fruits, vegetables and miscellaneous. There are 9 papers of fruits chapter, 12 papers of vegetables chapter and 3 papers of miscellaneous chapter. We wish to thank Sanjeet Kumar, Ph.D, Prof. Sobir, Prof Masayoshi Shigyo, Dr. Mohd Desa Haji Hassim, Parson Saradhuldhat, Ph.D for being keynote speech at this international seminar and all participants for very lively atmosphere during and after the seminar.

Bogor, May 2017

Editor

Dr. Darda Efendi
Dr. Awang Maharijaya

SYMPOSIUM PROGRAM

28 November 2016

07.30 – 09.00	*Registration desk open and morning coffee*
09.00 – 09.30	Welcome addresses **Dr. Darda Efendi**, Director of Center for Tropical Horticulture Studies, Indonesia **Prof. Herry Suhardiyanto,** Rector of Bogor Agricultural University, Indonesia
09.30 – 12.00 (20 minutes presentation + 10 minutes discussion)	**Session 1: Introductory Topics** **Dr. Sanjeet Kumar,** World Vegetable Center, Taiwan *"Science and Art of Tropical Horticulture: Stories, Impacts and Prospects"* **Prof. Sobir,** Indonesian Center of Excellence for Tropical Horticulture *"Tropical Horticulture: Past, Present and Future"* **Gregori Hambali, MSc,** Mekarsari, Indonesia *"Managing Tropical Fruit Collection"*
12.00 – 13.00	*Lunch*
13.00 – 14.30 (20 minutes presentation + 10 minutes discussion)	**Session 2: Opportunity in Tropical Horticulture Industry** **Prof. Muhammad Firdaus,** Bogor Agricultural University *"Enhancing the Competitiveness of Tropical Horticulture Products"* **Dr. Mohd Desa Haji Hassim,** International Tropical Fruit Network, Selangor, Malaysia *"Issues and Challenges in The Global Tropical Fruit Market"* **Parson Saradhuldat, Ph.D,** Department of Horticulture, Kasestsart University, Thailand *"Tropical Horticulture Business in Thailand"*
14.30 – 16.00 (20 minutes presentation + 10 minutes discussion)	**Session 3: Quality of Horticultural Products** **Dr. Darda Efendi,** Center for Tropical Horticulture Studies, Indonesia *"Quality Issues in Tropical Horticultural Products"*

	Tatas H. P. Brotosudarmo, PhD, Ma Chung University *"*Non-optical and optical spectroscopy as metabolomics platforms for determining the quality of horticultural products*"* **Dr. Irmanida Batubara,** Tropical Biopharmaca Research Center *" Quality Control on Herbal Medicine"*

29 November 2016

07.30 – 08.30	*Registration desk open*	
08.30 – 10.15	**Parallel session 1**	**Parallel session 2**
10.15 – 10.30	*Coffee Break and Poster Session*	
10.30 – 12.15	**Parallel session 3**	**Parallel session 4**
12.15 – 13.00	*Lunch*	
13.00 – 15.00 (@20 minutes presentation + 10 minutes discussion)	**Session 4 : Technology Needs for Improving Horticulture in The Tropics** **Prof. Masayoshi Shigyo,** Yamaguchi University, Japan *"Proposal for a forwarding model in order to encourage social interaction among HRs and/or PGRs via platform operation based on research collaboration in Indonesian vegetable crops"* **Prof. Sri Hendrastuti Hidayat,** Department of Plant Protection. Faculty of Agriculture. Bogor Agricultural University *"Integrated Disease Management for Vegetable Crops: Concepts and Practices"* **Dr. Catur Hermanto,** Indonesian Vegetables Research Institute (IVEGRI) *"Pest And Disease Threats and Challenges For Future Vegetable In The Tropic*"	
15.00 – 16.00	*Concluding and Remarks*	
16.00 – 18.00	*Farewell Drink*	

ORAL PRESENTATION SCHEDULE

Tuesday, November 29th 2016

Paralel 1

TIME	PRESENTER NAME	CODE	TITLE
08.30 – 08.45	Slamet Susanto	OP 1	Prolong Shelflife of Seedless Pummelo (*Citrus maxima* (L.) Osbeck) Fruit During Storage
08.45 – 09.00	Dini Hervani	OP 2	Cryopreservation of Long-term Plant Germplasm Storage
09.00 – 09.15	Sulassih	OP 3	Variability of Jackfruit Based on Morphology and Molecular ISSR
09.15 – 09.30	Ahmad Solikin	OP 4	Characterization of Local Durian Varieties In Central Java Using Molecular Markers Inter Simple Sequence Repeats (ISSR)
09.30 – 09.45	Nelinda	OP 5	Packaging Design and Postharvest Treatment to Maintain the Quality of Rambutan (*Nephelium Lappaceum* L.) in Distribution System
09.45 – 10.00	Maxmilyand Leiwakabessy	OP 6	Disease Incidence and Molecular Analysis of Banana Bunchy Top Virus in Bogor, West Java
10.00 – 10.15	Ajmir Akmal	OP 7	Transpiration rate of relationship fruit with Gamboge of Mangosteen (*Garcinia mangostana* L.)

Paralel 2

TIME	PRESENTER NAME	CODE	TITLE
08.30 – 08.45	Juang Gema Kartika	OP 8	Growth and Production of Some *Moringa oleifera* Lam. Accession at Several Harvesting Interval
08.45 – 09.00	Lutfi Izhar	OP 9	Conservation Agriculture with Soil Health: Optimal Fosfor Fertilizer Rate for Tomato (*Lycopersicon esculentum* Mill. L) on Inceptisols
09.00 – 09.15	Adhitya Mahendra K	OP 10	Stakeholders Analysis in Seed Provision System Development Originated from True Seed of Shallot
09.15 – 09.30	Endro Gunawan	OP 11	Policy Analysis on Shallot Stock Seed Program Though The Botanical Seed (*True Shallot Seed*) TSS
09.30 – 09.45	Ali Asgar	OP 12	Integrating Understanding of Indigenous Vegetable Nutrients and Benefits
09.45 – 10.00	Marlin	OP 13	Metabolite Changes in Shallot (*Allium cepa* var *aggregatum*) during Vernalization
10.00 – 10.15	Suhesti Kusuma Dewi	OP 14	The Effects of Vernalization and Photoperiod on Flowering of Shallot (*Allium cepa* var. *ascalonicum* Baker) in Lowland Area

Paralel 3

TIME	PRESENTER NAME	CODE	TITLE
10.30 – 10.45	Satriyas Ilyas	OP 15	Study of Phenology and Determination of Seed Physiological Maturity of Long Bean (*Vigna sinensis* L.) Based on Heat Unit
10.45 – 11.00	Endah Retno Palupi	OP 16	Chromosome Number Estimation of Diploid, Autotetraploid and Triploid Hybrid 'Rejang' Banana Using Protoplast from Male Flower (anther)
11.00 – 11.15	Yudiwanti Wahyu	OP 17	Performance of Some First Generation Corn Populations derived from Selfing and Sibbing for Developing Baby Corn Varieties
11.15 – 11.30	Ady Daryanto	OP 18	Inheritance of Chili Pepper Resistance Against Infestation of *Aphis gossypii* Glover (Hemiptera: Aphididae)
11.30 – 11.45	Edi Santosa	OP 19	Variation in Floral Morphology of Agamosporous *Amorphophallus Muelleri* Blume of Natural and Gibberellins Treatment
11.45 – 12.00	Kusuma Darma	OP 20	The Eco-Friendly Technology to Control Pests and Diseases of Shallot
12.00 – 12.15	Filemon Yusuf	OP 21	Phylogenetic Study of Indigenous Pulses Based on Morphological and Inter Simple Sequence Repeat (ISSR) Markers

Paralel 4

TIME	PRESENTER NAME	CODE	TITLE
10.30 – 10.45	Ririh Sekar Mardisiwi	OP 22	Growth and Production of Black Cumin (*Nigela sativa* L.) at Several Composition Media and Watering Interval
10.45 – 11.00	Evi Setiawati	OP 23	Growth and Production of Black Cumin (*Nigela sativa* L.) at Shade Levels and Nitrogen Doses
11.00 – 11.15	Tatik Raisawati	OP 24	The Nutritional Value and Total Flavonoid Content of *Sonchus arvensis* L. Leave
11.15 – 11.30	Dewi Sukma	OP 25	Diversity Analysis of Phalaenopsis by Using SNAP Marker
11.30 – 11.45	Widya Sari	OP 26	Morphological, Molecular Charactheristics and Pathogenicity of *Fusarium* spp. from Some Cultivars of Banana
11.45 – 12.00	Juwartina Ida Royani	OP 27	In Vitro Shoots Multiplication of Sapodilla (*Manilkara zapotta* Van Royen) with Modified MS Media
12.00 – 12.15	Willy B. Suwarno	OP 28	Melon Breeding: Past Experience and Future Challenge

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Collection and Characterization of Shallot Germplasm in Effort to Support National Food Security

Ita Aprilia[1], Erviana Eka Pratiwi[1], Awang Maharijaya[1,2], Sobir[1,2], Heri Harti[2]

[1)] *Department of Agronomy dan Horticulture, Bogor Agricultural University, Jalan Raya Dramaga 16680 Bogor, Indonesia*

[2)] *Center for Tropical Horticulture Studies, Bogor Agricultural University, Kampus IPB Baranangsiang Jalan Pajajaran Bogor – 16144, Indonesia*

Abstract

Shallot is one of the important commodities in Indonesia because it's primary function as the main component of condiment almost in all dishes. It affect the demand for shallot will always exist and will rapidly increase belong to contribution of world population growth. So the increasing of shallot production should be carried out to maintain the stability of shallot suply. The increasing of shallot production can be maintained by the improvement of one or more characters of plants such as productivity, resistance to pests and diseases, and more else through plant breeding programs. The collection of genetic diversity through germplasm collection activity is the first step in the breeding programs. The collection of genetic diversity through germplasm collections could be obtained in several ways. Collection and identification process in order to shallot genetic diversity study was conducted by field exploration to several regions in Indonesia, the introduction and expansion of genetic diversity through radiation. The result of exploration and the introduction activities resulted on 79 genotypes collection, 35 genotypes among had been successfully characterized and testing the ability of flowering. The results showed that there was diversity within characters as well as of crown and bulbs characters and plants ability to the flowering time. Diversity was also demonstrated from the results of cluster analysis which divided the total of 35 genotypes into three major groups. In other hand, the result from genetic diversity expansion through mutations clustered a total of 55 genotypes into a group. Shallot germplasm collections were currently partially stored in the form of bulbs and some genotypes are stored in the form of botanical seeds/true shallot seed.

Keywords: Diversity, Genotype, Exploration, Introductions, True Shallot Seed

1. Introduction

Population growth and global climate changes is a challenge especially for the production of agricultural commodities including shallot. Shallot become one of the important commodities in Indonesia due it's primary function as a component of most entire cooking spice. It's presence as a major component in daily cooking make the shallot consumed almost every day by the people, especially in households. According to BPS data (2013) consumption of shallot in 2009 and 2010 at 2.52 kg / capita / year, in 2011 at 2.36 kg / capita / year, the year of 2012 amounted to 2.76 kg / capita / year, and the year of 2013 was 2.06 kg / capita /year. The data showed that consumption of shallot per capita/ year tend to be stable. So that the population growth will be positively correlated to the increasing of the national consumption of shallot. Shallot are sentisitif to the climate change. In addition to direct impact, climate change also affects indirectly through the development of pests and diseases. High rainfall is a

condition optimal conditions for the development of fungi that cause disease on shallot crop. Pests and diseases to be one of the limiting in shallot production.

Plant breeding program is one of the solution to the improvement of shallot in the future. Through plant breeding programs can be assembled plant that have the characteristics of high productivity to meet the challenges of increased production due to increased population. Plant breeding program is also able to assemble tolerant plants to environmental stress and resistance to pests and diseases to address the challenge of global climate change. The collection process is the first activity in the breeding program that aims to collect genetic diversity. Genetic diversity is important and major capital required in the breeding programs. Genetic diversity can be obtained through the exploration of several areas in the country, the alien plant introduction, hybridization, mutation, and genetic engineering. Therefore, activity of shallot germplasm collection is carried out in order to collect genetic diversity of shallots for shallot crop development in the future.

2. Methods

Shallots Germplasm collection

The collection process of shallots germplasm used several methods such as exploration into several regions in Indonesia including shallot production areas such as Brebes and Nganjuk; in collaboration with the National Council of Shallot, shallot farmers, and seed council; introduction shallots from many countries such as Thailand, Philippines, and Vietnam; as well as the expansion of genetic diversity by radiation. Germplasm were then planted with the purpose of propagation and conservation in the Garden Experiments II Tajur IPB Bogor, Bogor Experimental Farm Horse Sand and Sand Experimental Farm Sarongge Cipanas.

Characterization

Characterization started with the planting of the collection conducted in Experimental Farm of Pasir Kuda Bogor, Experimental Farm of Tajur II Bogor and Experimental Farm of Pasir Sarongge Cipanas. Planting methods used standart farming techniques for shallot cultivation. Shallot bulbs planted on land in lines with a spacing of 20 x 20 cm. Treatment for cultivation included irrigation, fertilizing and pest control. Characterization performed on both qualitative and quantitative characters for crown and bulb crops identification based on the individual observations guidebook (Kementrian Pertanian, 2013) and Calibration Book (Naktuinbow 2010). Morphological observation was focused on performation of canopy at 3 weeks old plants after planting (MST) or at the time of steady stage of vegatatif growth. Wherease, the observation of tubers morphological characters was in after harvest (8-9 MST).

Germplasm collections generated by radiation was still in the process of propagation and characterization visually through the observation of plant fitness especially tuber part. In every generation, individual plants that have the same fitness should be collected into a single slot genotype. Shallots planting was carried out in the Experimental field of Pasir Kuda-Bogor with plastic shade application to prevent rainwater. The cultivation techniques, plant spacing, and maintenance of the radiation plant collection was cariied out in the same way as a plant collection from exploration and introduction.

Flowering test

In addition to fitness observation of plant morphology, also done by observations on the plants ability to the flowering time. The research method for the plants ability to the purposed to the flowering induction was including the bulb vernalization at a temperature of 10 ° C for 21 days and the planting was carried out in the highlands position located in Experimental

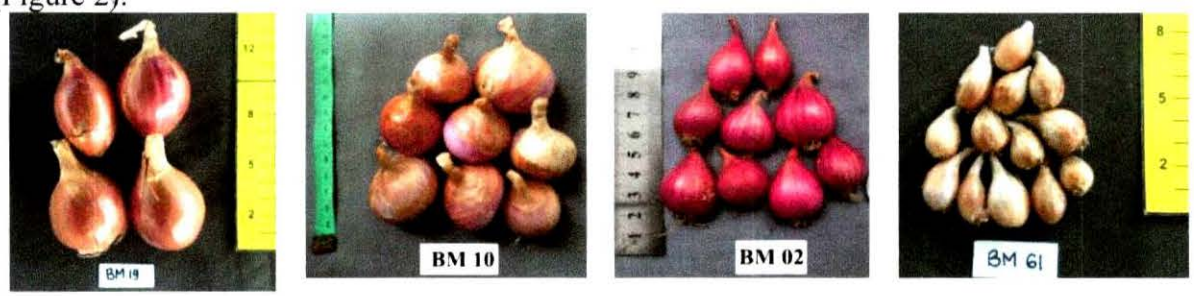
Garden of Pasir Sarongge. Planting was carried out by mounting with plastic shade applications with pacing of 20 x 20 cm. Plant maintenance was including irrigating, fertilizing, and control of plant intruder organism. Observations was made by counted the plants ability to produce flowers.

3. Results and Discussion

Results of exploration activities and the introduction of shallot germplasm managed to collect in total 79 genotypes and among a total of 35 genotypes have been successfully characterized the performance of its morphology. The results showed the existence of diversity in all the 35 genotypes. This diversity was apparent, especially on the characters contained bulbs. The diversity of tuber longitudinally shape were diverse into an oval shape-being, elliptical wide, round, rhombus, and elliptical cross-being (Figure 1).

Pic. 1 The diversity of tuber shape

Diversity on the tubers size was consisted of very large sizes, large, medium and small (Figure 2).

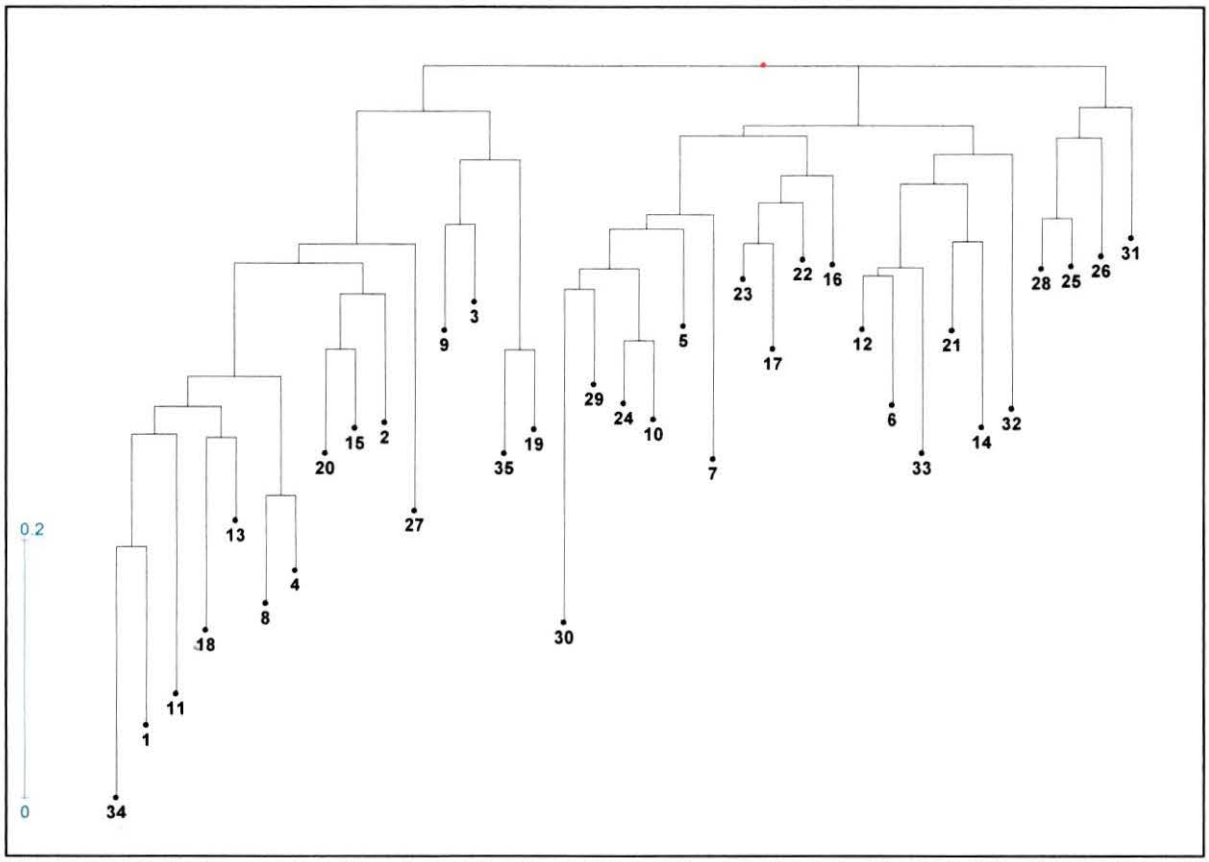


Pic. 2 Diversity on the tubers size

In other hand, the dominant color of dried tubers was red with a diverse color intensity, only one genotype that has color white bulbs.

Pic. 3 The dominant color of dried tubers

Diversity among 35 genotypes of collections that have been successfully characterized also evidenced by the results of cluster analysis using Darwin software version 6. The selected characters which performed in the similarities analysis has been evaluated in the previous study. Based on the results of cluster analysis, a total of 35 genotypes were divided into three major groups (Figure 4). Differences in group demonstrated the diversity that exists among genotypes. The genotypes that was in one group will likely have a close genetic distance and same performanced characters.



Note: 1 (BM 01), 2 (BM 02), 3 (BM 03), 5 (BM 05), 6 (BM 06), 7 (BM 07), 9(BM 09), 10 (BM 10), 11 (BM 12), 12 (BM 18), 13 (BM 19), 14 (BM 20), 15 (BM 24), 16 (), 17 (BM 25), 18 (BM 26), 19 (BM 28), 20 (BM 29), 21 (BM 47), 22 (BM 56), 23 (BM 57), 24 (BM 58), 25 (BM 59), 26 (BM 60), 27 (BM 63), 28 (BM 64), 29 (BM 65), 30 (BM 66), 31 (BM 67), 32 (BM 68), 33 (BM 72), 34 (BM 75), 34 (BM 22BM 76), 35 (BM 78)

Pic. 4 Cluster Analyis result based on 35 shallots collection genotype

The plant flowering ability test results also showed the diversity. Genotypes that were capable to flowering test among BM 01, BM 02, BM 03, BM 05, BM 06, BM 07, BM 10, BM 12, BM 18, BM 19, BM 20, BM 24, BM 25, 18 BM 26, BM 28 , BM 47, BM 57, BM 58, BM 59, BM 60, BM 63, BM 64, BM 65, BM 66, 31 BM 67, BM 68, BM 72, BM 75, BM 76 and BM 78. Wherease, the genotypes that did not generate interest on flowering test such as BM 09, BM 22B, BM 29, BM 36, BM 46 and BM 56. the ability of flowering in shallot crop is very important to understand because it is associated with the development of the seed in the form of botanical seed (true shallot seed) and for development of shallot through conventional plant breeding activities.

The result of the genetic diversity expansion through radiation was now successfully established diversity in total of 55 species. Genotypes which generted from radiation has not

been yet characterized and still on M4 generation progress and there was still diversity found in a single slot. Diversity was confirmed through visual observation mainly for bulb form characters. Shallot germplasm from exploration and the introduction were currently stored at the Center for Tropical Horticulture (PKHT) IPB as a collection for future study. The genotypes from exploration and the introduction collections was stored in the form of bulbs and botanical seeds for the botanical (Table 1). In other hand, the genotypes from radiation were all stored in the form of tubers.

Tabel 1 List of Shallots Collection

Genotype	Collection Form		Genotype	Collection Form		Genotype	Collection Form	
	Tuber	Seed		Tuber	Seed		Tuber	Seed
BM 01	√	-	BM 35	√	√	BM 60	√	-
BM 02	√	√	BM 36	√	-	BM 61	√	-
BM 03	√	√	BM 40	√	-	BM 62	√	-
BM 05	√	√	BM 41	√	√	BM 63	√	-
BM 06	√	-	BM 42	√	-	BM 64	√	-
BM 07	√	-	BM 43	√	-	BM 65	√	-
BM 08	√	-	BM 44	√	√	BM 66	√	-
BM 09	√	-	BM 45	√	-	BM 67	√	-
BM 10	√	-	BM 46	√	-	BM 68	√	-
BM 12	√	√	BM 47	√	-	BM 69	√	-
BM 14	√	-	BM 49	√	-	BM 70	√	-
BM 15	√	√	BM 50	√	-	BM 71	√	-
BM 16	√	-	BM 51	√	-	BM 72	√	-
BM 18	√	-	BM 52	√	-	BM 73	√	-
BM 19	√	√	BM 53	√	-	BM 74	√	-
BM 20	√	-	BM 54	√	-	BM 75	√	-
BM 21	√	√	BM 55	√	-	BM 76	√	-
BM 24	√	-	BM 56	√	-	BM 77	√	-
BM 25	√	√	BM 57	√	-	BM 78	√	-
BM 26	√	-	BM 58	√	-	BM 79	√	-
BM 29	√	-	BM 59	√	-			

4. Conclusion

Exploration, introduction and genetic diversity expansion activities through radiation managed to collect in total 134 genotypes of shallot. Based on the genotypes that have been successfully characterized, the genetic diversity between populations showed from shallot collection. Information flowering plants ability also successfully obtained from some genotypes. A total shallot germplasm has been collected, the diversity information was available and the flowering plants ability was characterized to be initial knowledge for the future development of shallot plants and cultivation.

References

Kementerian Pertanian. 2013. Guidelines for the conduct of test for distinctness, uniformity and stability [Onion (*Allium cepa* O. Fedtsch)]. Jakarta (ID): Kementerian Pertanian

Naktuinbouw. 2010. Calibration book *Allium cepa* (Cepa Group), *Allium cepa* (Aggregatum Group) and *Allium oschaninii* O; Fedtsch. and hybrids beetween the.