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Prediction model of production patterns of shallot development in the highlands of Indonesia

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ABSTRACT

Majalengka's great potential in shallot production has not been optimal in terms of continuity and stability of production and prices. For this reason, it is necessary to arrange the production pattern and downstream horticulture of shallots to be sustainable throughout the year. The purpose of this study is to map and identify production patterns in order to make prediction model that provides production and price stability with various strategies using Fuzzy logic approach based on ANFIS. In this method time series data, written information, with input variables of production patterns with a cropping pattern system and production patterns was used with a system of shallot needs with an output variable. The results of the analysis indicate that the prediction of the production pattern of the shallot cropping pattern was more emphasized on adjustment to the needs of the use and consumption value, also the prediction of the production pattern was adjusted to the results of the analysis per quarter by looking at the market objectives both for the consumption market (around 40-50% in quarter I, III and industry only around 20-30% and 60% seeds for quarter III and quarter I, II only 20%) as well as recommendations on the implementation of various strategies that are expected through the establishment of information centers on cropping patterns, creation of new market opportunities, partnership pattern, expansion of planting area. The hope of this research is to strengthen the strategy for achieving sustainable shallot production.

Key words : Fuzzy logic approach, production pattern, production stability, shallot

INTRODUCTION

The uncertainty of the results obtained is one of the characteristics of agricultural commodities (Yilong, 2018; Bayat *et al.,* 2019). Climate change is one of the triggers for the problem of uncertainty in results (Boer *et. al.*, 2014), and this can have a negative impact (Mashiza, 2019). Horticulture is one of the commodities that has uncertainty in terms of production and prices (Hariyani, 2017; Singh and Maiti, 2020), as well as the shallot commodity which is always synonymous with this (Andayani *et. al.*, 2016). Shallots are one of the horticultural commodities that have high potential and economic value, also this onion extract can affect soybean production (Hasanah, *et. al.*, 2020). The need for shallots as a complementary food ingredient should be balanced with sufficient supply (Ansar *et. al.*, 2019) so that shallot is a strategic commodity (Sutardi and Porwoningsih, 2018), as well as important vegetable crops in Indonesia (Fitriana and Susandarini, 2019), and as one of the main ingredients that cannot be replaced (Pane and Supriana, 2020). Shallots can also be produced as an ingredient in medicinal production, then this shallot production must be increased (Idaryani *et al.*, 2021). However, production is still slow and not optimal while the demand and consumption of shallots is getting higher. The demand for shallots

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continues to increase while production in certain months causes fluctuations in production and prices (Andayani *et al.*, 2016). Shallots indicate a production risk commodity, although it is still at a low level (Febri *et al.*, 2019; Erny *et. al.*, 2019; Lokesh *et al.*, 2021) so that this commodity has production instability (Trisnasari *et al.*, 2020) and is susceptible to pests and diseases (Berhanu and Berhanu, 2014). Seeing the current conditions, it is necessary to encourage the production of shallots related to consumer and industrial demand (Napitupulu *et al.*, 2021). By looking at the phenomenon related to shallots, it is necessary to arrange the production system in the dry season and the rainy season so that the production of this commodity can be sustainable throughout the year in the highlands. This study has the aim of how to map production patterns and identify production patterns so that they can make a predictive model of production patterns on onion development in Majalengka Regency.

MATERIALS AND METHODS

This research was conducted by quantitative descriptive method using a fuzzy logic approach. A fuzzy system is a system based on rules in the form of a collection of IF-THEN rules. Fuzzy logic is used in decision making (Dewi *et al.*, 2021), and this method is considered a good alternative to linear models based on utility theory (Bosma *et al.*, 2011).

Fuzzy logic approach is carried out through three stages, including: (1) The stage of *fuzzification* is mapping from firm input to fuzzy sets, (2) The inference stage is the generation of fuzzy rules and (3) The affirmation stage (*Defuzzyfication*) is the transformation of the output from a fuzzy value to a firm value. The variables used in this study consisted of two input variables, namely (1) the production pattern with the cropping pattern system and (2) the production pattern with the use of shallot needs and one output variable, namely the development of shallots.

The analysis of the assessment of each variable in this study was carried out using an approach *fuzzy logic* to quantify the obscurity. This is done with the consideration that the variable pattern of production with the cropping pattern system, the pattern of production with the use of shallot needs and horticultural development is vague and cannot be classified with certainty. So, this fuzzy logic approach is considered to be able to classify each issue based on the level of importance according to the observations that have been made. The research location was conducted in Majalengka Regency, West Java in the highlands which is one of the centers of shallot production.

RESULTS AND DISCUSSION

Development of Onion

The development of production and prices of shallots continues to fluctuate so that this commodity becomes one of the contributors to inflation, so Bank Indonesia has initiated the formation of a shallot cluster in the highlands area of Argapura District, Majalengka, but this cluster is still not optimal in its development. The results of the analysis of the ANFIS method with parameters, onion price (OP), total population (TP), consumption per quarter (CQ), Use Needs (UN) of shallots can be seen in Fig. 1.

From the analysis of calculations using the ANFIS method, it was found that the price of shallots in the highlands was considered quite good, so shallot farmers in Majalengka Regency at this time must be able to create market opportunities other than the existing market.

As shown in Table 1, the population in Majalengka Regency is divided into three categories, namely children, adults, and the elderly who consume shallots. The results of the analysis show that in the highlands, the largest consumption of shallots is in the category of children and adults. This shows that children and adults believe more in the benefits of shallots for health other than as a complementary seasoning or food flavoring. Seeing this condition, it is necessary to carry out educational activities or further understanding of the elderly about the benefits of red onions for health.

The consumption in the first quarter is from December to February, the second quarter is from March to June, and the third quarter is August to October (Table 2). The results of the analysis show that in the second quarter the level of consumption of shallots is low, while in the second quarter it should be

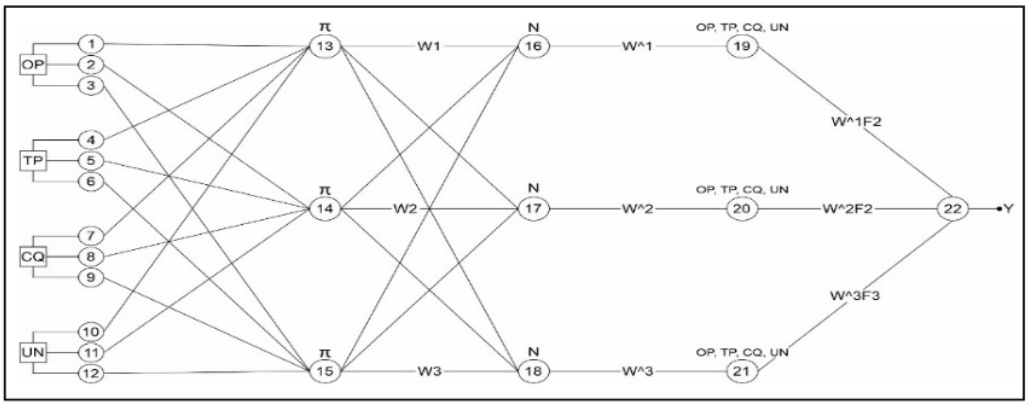

Fig. 1. Results of analysis of local needs shallots.

Table 1. Results of calculation analysis related to the category of population consuming shallots

Total Population			
Children (C)	Senior (S)	Mature (M)	Plain Area
0.99960016	0.806386582	0.375361285	Highlands

Source: Results of data calculation analysis.

high consumption due to the celebration of the Eid al-Fitr. Seeing this phenomenon, it can be assumed due to the condition of a pandemic covid-19 also occur over supply of onion from other regions, such conditions need to onion farmers create market opportunities and strategies for other markets in the second quarter of this, or it can also be more focus on seed production compared with consumption shallot production.

The results of the calculation analysis according to the use of needs show that the use of shallots for hotels, restaurants, catering, stalls and households is higher than the use of industrial needs and seeds (Table 3). It can be assumed that the shallot planting area in Majalengka Regency is still considered low so that it is not sufficient for industrial needs, as well as productivity and quality not in accordance with industrial standards. However, farmers are still reluctant to partner with the industry because there are still long delays in paying from the industry.

Prediction of Shallot Production Pattern

In Indonesia, including Majalengka, the supply of shallots is considered not to be a major problem, but what can be used as an important point in shallot farming is how to regulate the shallot production pattern so that at harvest time, there will be no oversupply.

Table 2. Quarterly consumption of shallots in Indonesia

Quarterly Consumption (QC)			
I (T1)) (December-Pebruary)	II (T2) (March-Juny)	III (T3) (August-October)	Plain Area
0.211069	0.102029	0.735294	Highlands

Source: Results of data calculation analysis.

Table 3. Results of the calculation analysis for needs of shallot

Used Needs of Shallot (UN)			
Seeds	Industry	Hotel, restaurant, catering (Horeca) & /Household	Plain Area
0.516944	0.337838	0.995575	Highlands

Source: Results of data calculation analysis.

prices fall at the farm level. This is to maintain the stability of onion prices. One of the efforts to avoid fluctuations in the price of shallots is by regulating the production and harvesting period of shallots through the application of appropriate cropping patterns.

By looking at the results of the analysis calculation, the prediction of the production pattern of shallots associated with: (1) the consumption value per quarter, namely the first quarter (December-February) and the third quarter (August-October) in the highlands can carry out shallot cultivation by the purpose of harvesting shallots for consumption and shallot seeds and (2) the use value of shallots has a low value for industrial and seedling uses. By looking at this condition, the pattern of production in the highlands must change towards the achievement of harvesting for industrial purposes and seeds.

Prediction Model of Shallot Commodity Production Pattern

Aspects of the supply of shallots apart from the main ones in terms of the target market value, namely the existence of (1) a location to carry out shallot cultivation, (2) a supportive climate in the implementation of shallot cultivation, (3) supporting technology in carrying out shallot cultivation and (4) the price of production factors that will affect the implementation of shallot cultivation. The export destinations of shallots which have the opportunity, although still in limited conditions, can go to Singapore, Malaysia, Brunei Darussalam and must be able to maintain the occurrence of shallot imports which have been from China, Vietnam and the Philippines.

The implementation of onion cultivation in the highlands in Majelengka Regency in general has become a habit of farmers and has even become a culture passed down from generation to generation from the family. This condition makes the experience of farmers in carrying out shallot cultivation take a long time. This is one of the supporting factors for success in farming, although it must be adjusted to current developments with supporting factors. The potential of land and climate also supports onion farming. However, there are many other factors that can be considered as factors that must be optimized in the development of the shallot cluster in Majalengka. Conditions in the field are still a lot of pest and disease attacks, especially in the rainy season, an abundance of shallots during the main harvest, there is still a supply of shallots from outside the region, the quality is still not optimal, especially for industrial markets, supporting institutions are not optimal, there are still fluctuations in production and prices.

Seeing the conditions in the field and the results of the calculation of the shallot research analysis, it is necessary to have several important points in the shallot production pattern, namely: (1) the production pattern by paying attention to the value of the consumption of shallots, (2) the production pattern by taking into account the value of the need and use of shallots and (3) production pattern with partnership pattern. From these results, it can be assumed by several things such as the arrangement of cropping patterns with the creation and strategy of market opportunities, the existence of an integrated production and consumption data information center so as to facilitate access for farmers in regulating cropping patterns, optimal supporting institutions in mentoring, coaching, education, and training activities. application of more optimal shallot farming technology. It can be seen from the model produced in supporting the development of onion clusters in Majalengka Regency in the highlands.

In the highlands, the model in Fig. 2 shows that the potential of shallots in this region is very high, not only high production but many factors that support it. An independent farmer group, one of the *champions* for shallot farming activities, has shown its progress to the national realm. In the first and third quarters, 30 percent of shallots for seeds could be produced, considering that the market is still somewhat limited, while for industry it can still be produced, although not as much for consumption, around 40 percent and 50 percent, respectively. In the highlands, it has collaborated with the market for seed needs with PT Bina Gloria starting in 2020 and exports to Singapore, although it is still limited to below 10 per cent.

In the second quarter the production pattern was more focused on seed production because market cooperation was already

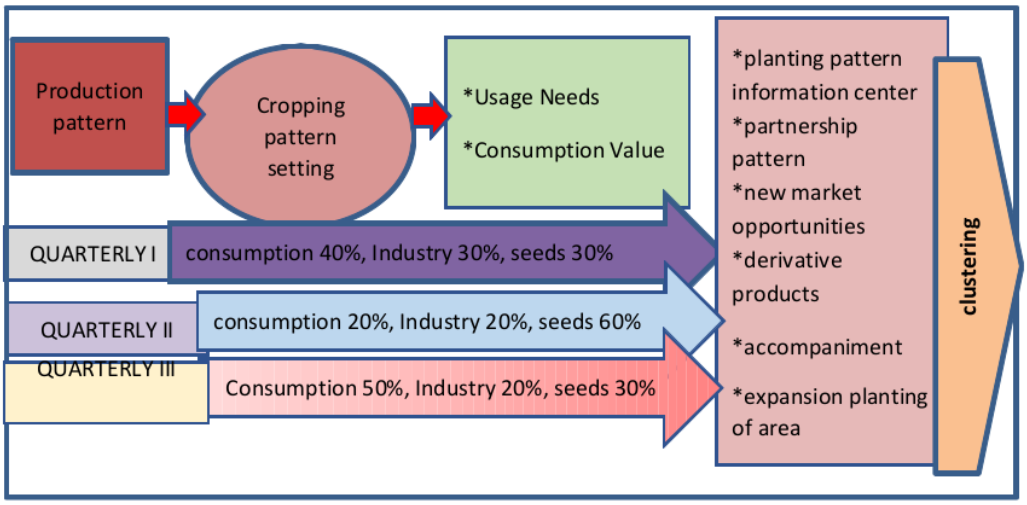

Fig. 2. Prediction model of shallot production patterns in the highland.

supportive. For the production of industrial purposes can also be considered because many industries require shallots as raw material for processing. Supporters for regulating production patterns and cropping patterns of shallot commodities that need to be considered are the establishment of: (1) information center on cropping patterns in horticultural commodities to stabilize production and market needs, this can be accessed by all plain areas, (2) partnership patterns must be re-established with the industry, (3) looking for new market opportunities for consumption, seeds and industry, (4) derivative products from shallots must be prepared immediately to increase added value and utilize rejected shallots, (5) assistance must be carried out periodically both by academic partners, industry, other policy makers and (6) expansion of planting area needs to be considered, especially for highland areas. By paying attention to the results of the analysis and the existing phenomena as well as recommendations from the resulting model, the development of shallot clusters, especially in the highlands, can be optimized so that the clustering of shallots in Majalengka Regency can be realized by increasing the income of shallot farmers.

CONCLUSION

The map of shallot production patterns in the highlands has been patterned with the habits of the farmers to plant shallots, either in the first quarter (December-February), 2nd quarter (March-June) and 3rd quarter (August-October) or adjusted to climatic conditions and water availability. In maintaining the stability of production and prices which so far still indicate fluctuations due to the imbalance of supply and demand patterns, the results of the calculation analysis for the production pattern of shallots in the highlands should pay attention to the production pattern and the planting pattern of shallots associated with the need for use and consumption value. The prediction model for the production pattern for shallots produced from this study in the highlands area for seeds is 60% in the second quarter but for the first and third quarters, the potential for onion consumption is 40-50%, the rest is for industry. The production potential is in the highlands area so that clustering is suitable in this area.

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REFERENCES

1 Andayani, S. A, Sulistyowati, L. and Perdana, T.

(2016). The development of red chilli agribusiness cluster with soft system methodology approach in Garut. *J. Mimbar* **32** : 302-10.

Andayani S., Suhaeni, A. and Sumekar, Y. (2019). distribution patterns and marketing efficiency of red onion in the highland of Majalengka Regency. *Int. J. Vet. Sci. Agric. Res.* **1** : 14-28.

Ansar, M. Wahyudi, I. and Tangkesalu, D. (2019). Growth and yield of shallots planted between chili plants. *Agroland* **6** : 63-70.

Bayat, M., Chudinova, E., Zargar, M., Lyashko, M., Louis, K. and Adenew, F. K. (2019). Phyto-assisted green synthesis of zinc oxide nanoparticles and its antibacterial and antifungal activity. *Res. on Crops.* **20** : 725-30.

Berhanu, M. A. and Berhanu, G. A. (2014). Constraints of Onion (*Allium Cepa* var. aggregatum) in the case of Bibugn Woreda Amhara, Regional State, Ethiopia. *Food Sci. Quality Manage.* **32** : 41-45.

Boer, R. and Yuli, S. (2014). Climate change impact on Indonesia food crop. Paper presented at The Sixth Executive Forum on Natural Resource Management: Water and Food in a Changing Environment at SEARCA Headquarters, Los Baños, The Philippines, April 11-13.

Bosma, R., Kaymak, U. and Berg, V. (2011). Using fuzzy logic modelling to simulate farmers' decision -Making on diversification and integration in the Mekong Delta, Vietnam. *Soft Comput.* **15** : 295-310. doi : org/10.1007/s00500-010-06180-7.

Dewi, R. A., Syah, A. Z., Kholiq, A., Agus, R.T.A. (2021). Decision support system using fuzzy logic method of Tahani model for student selection. *J. Phy. Conf. Series Bristol* **1783** : doi : 10.1088/1742-6596/1783/012011.

Erny, Dwidjono, H. D., Masyhuri and Waluyati, L. R. (2019). Farmers behavior towards Lembah palu Shallot farm risks in central Sulawesi Indonesia. *Eurasian J. BioSci.* **13** : 9[illegible]-36.

Febri, E., Suryanty, M. and Arianti, N. N. (2019). Risk analysis of onion farming. *Agric. Socio- Econ. Business* **1** : 45-51. doi.org/10.31186/jaseb.1.1.45-51.

Fitriana, N. and Susandarini, R. (2019). Short communication: Morphology and taxonomic relationship of shallot (*Allium Cepa* L. group aggregatum) cultivars from Indonesia. *Biodiversitas* **20** : 2809-814.

Hariyani. N. (2017). The risk level of production and price of red chili farming in Kediri Regency, East Java Province. Indonesia. *Agrise* **17** : 81-87.

Hasanah, Sitepu, Y. and Yanti, F. E. (2020). The role of shallot extract concentration application on soybean varieties production. *IOP Conf. Series Earth Environ. Sci., Bristol* 454 doi:10.11088/1755-1315/454/1/012138.

Idaryani, Rauf, A. W. and Nappu, M. B. (2021). Respons growth and production of shallot (*Allium ascalonicum* L.) on complementary liquid fertilizer (CLF) dosage and interval of application time. *IOP Conf. Series, Earth Environ. Sci. Bristol* **803** : doi : 10.1088/1755-1315/ 803/1/012014

Lokesh, Jakhar, S. S., Kumar, S. and Malik, A. K. (2021). Impact of plant oils and containers on storage of onion (*Allium cepa*) seeds. *Res. Crops* **22** : 588-95.

Mashiza, T. M. (2019). Adapting to climate change: Reflections of peasant farmers in Mashonaland West Province of Zimbabwe. *JAMBA J. Disaster Risk Stud.* **11** : 1-8.

Napitupulu, D., Nurzannah S. Endah and Siagian, D. R. (2021). Sustainable shallot production achievement through analyzing the land suitability and introducing the proper agronomic cultivation practices in Samosir Regency. *IOP Conf. Series, Earth Environ. Sci., Bristol* **807** : doi : 10.1088/1755-1315/807/2/022073.

Pane, T. C. and Supriana, T. (2020). The supply chain of north Sumatera shallot. *IOP Conf. Series Earth and Environ. Sci., Bristol* **454** : doi : 10.1088/1755-1315/454/1/012037.

Singh, V. and Maiti, R. K. (2020). Advancement of research on post-harvest management of fruit crops. *Farm. Manage.* **5** : 54-70.

Sutardi and Porwoningsih, H. (2018). Environment friendly cultivation of shallot on sandy land as specified location in Yogyakarta". *Jurnal Sumberdaya Hayati* **4** : 1-

Trisnasari, W., Marimin, M., Perdana, T. and Deliana, Y. (2020). Situational analysis of shallot supply chain innovation system: A case study of Majalengka, west Java, Indonesia. *Int. J. Supply Chain Manage.* **9** : 191-[illegible]6.

Yilong, D. (2018). Article of the risk pricing mechanism of order agriculture supply chain. *Manag. Eng. Brighton East* **31** : 61-67.

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