A description of the characteristics of shallot farmers using pesticides

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Abstract. The biggest use of pesticides is in the Brebes Regency, which is an onion farmer. Farmers in Brebes use a mixture of more than 5 types of pesticides. At the onion pest season, farmers can spray pesticides every 2 days. The results of research on pesticide residues in the soil show that the soil in Brebes still contains chlorpyrifos residues from 0.39 to 0.72 mg/kg. On average, farmers spray onions 15-20 times during the planting period, which is about 2 months. The most widely usage of pesticide is in Dursban 200 EC. This study aims to look at the characteristics of sprayers male farmers and the use of pesticides. The population of shallot male farmers are sprayers male farmers who live in the villages of Pamulihan, Larangan, Siandong, Rengaspendawa, and Sitanggal. The control sample is taken randomly while the case sample is taken by purposive sampling. The results obtain that the majority of respondents’ education is elementary school graduation (40%), have no history of chronic illness (76%), BMI (Body Mass Index) normal (64%), smoking (66.7%), not drinking alcohol (65.3%), the average spraying frequency is ≥ 3 times a week. The use of high dosage of pesticides (> 183.12 cc) was most in the control group at 66.0% compared to case group 44.0%. The agricultural activities that cover all activities from planting to harvest are mostly carried out by the case group at 100% compared to 97.3% of control group. Much personal protective equipment (PPE) is not used when spraying. The storage distance of shallots is ≤ 5 meters from the gathering place of the family. At the time of spraying, the opposite direction when spraying is more in case respondents at 28.0% compared to 26.0% controls. Post-harvest spraying is performed more in cases with 52.0% compared to 40% in controls. The use of spraying clothes that are the same as clothes worn at home was more in the control group which was 72.0%. The behaviour of not handwashing with soap after spraying pesticides is mostly carried out by case group at 92.0%. Information and education related to pesticide usage is still needed.

1. Introduction
Pesticides are toxic chemicals. Excessive use of pesticides can be a source of contaminants for food, water, and the environment. One impact of the use of pesticides is the lagging of pesticide residues in
agricultural products and the soil, as well as the dangers of residues for human health. In general, farmers spray their plants intensively with pesticides which may leave residue in their tubers.

One factor that can reduce the quality of spermatozoa is exposure to pesticides. Pesticides have a comprehensive impact on organs, from pregnancy to the elderly. Based on WHO data there are 1-5 million cases of pesticide poisoning in farmers, especially in developing countries (80%).[1] Pesticides can reduce FSH and LH levels. Decreased FSH and LH can reduce Leydig and Sertoli cell function. This decline in function will affect the process of spermatogenesis.[1] Brebes is the biggest pesticide user area in all of Indonesia. The use of pesticides in the Brebes Regency is relatively environmentally unfriendly and very risky because of the high dosage of pesticide exposure in terms of both the number and type or combination of pesticides.[2] Based on previous research found that farmers in Brebes use a mixture of more than 5 types of pesticides. Mixing of these pesticides consists of carbamate, organopathic, and pyrethroid groups. This group is a pesticide group which has a half-life of 1-28 days so that it can disappear quickly in the soil. This mixture has the benefit of killing caterpillar eggs, caterpillars and leaf fertilizers as well. According to farmers, if only using one type of pesticide then the pesticide cannot kill pests that attack onion plants such as caterpillars, termites, and grandong (caterpillar eggs). Another purpose of spraying this mixture is practicality. Spraying one time can kill pests and fertilize the onion plants. Regita Damayanti's research results in Wanarsari District, Brebes obtain data that onion farmers who use the dosage of pesticide that do not comply with the rules as much as 87.3%. Farmers usually use 2-3 times the dosage stated in the package. This is performed by farmers to be more effective in killing pests of onion plants.[3] The frequency of spraying shallots (60%) 3-5 times routinely every week. Farmers keep the remaining pesticides from spraying in their homes. Muamilatul Mahmudah's research results in Brebes Sub-District, Brebes Regency stated that the results of an average examination of the cholinesterase level of a farmer's wife were 73,946% (poisoning). The length of time a farmer works in an agricultural deposit that allows exposure to pesticides (> 3 hours a day) is 81.1%.[4] The results of Imelda's research in Kersana District, Brebes stated that 100% of respondents in carrying out agricultural activities or spraying pesticides do not use PPE (Personal Protective Equipment). Farmers averagely work for 6.7 (± 2.40) hours a day, with a minimum of 2 hours and a maximum of 12 hours a day.[5] The time of exposure and the number of pesticides used will affect the decline in infertility.[6,7] If the onion pest season, then farmers can spray pesticides every 2 days. The results of research on pesticide residues in the soil indicate that the soil in Brebes still contains chlorpyrifos residues from 0.39 to 0.72 mg / kg,[8] In terms of frequency of spraying, the average farmer sprays onions about 15-20 times during the planting period, which is around 2 months. The most widely used pesticide is Dursban 200 EC (chlorpyrifos 200 g / l).[9]  

2. Method

This study was an observational analytic study with cross-sectional study design. Subjects are onion farmers in Pamulihan, Larangan, Siandong, Sitanggal, and Rengaspendawa villages in the Larangan District. Prohibition of Subdistricts, Brebes Regency was chosen as the location of the study site because this area is the biggest pesticide user area in Brebes. The population of the case and control sample in this study was male farmers spraying pesticides in 5 villages, control samples were taken by simple random sampling. Case samples were 25 male farmers and control 50 male farmers (1: 2). While the case was taken by purposive sampling with inclusion criteria, namely pesticide spraying farmers for at least 2 years, not having descendants for at least 1 year from the beginning of the marriage, and the male farmers wanted to be invited to cooperate in this study. Data was collected through farmers collected at the gathering point of farmer groups in each village. The enumerator interviewed the male farmer using a structured questionnaire. The results of the questionnaire were inputted and processed with SPSS version 20.
3. Result and discussion
Based on the education category, it can be seen that the majority of respondents having an elementary school education are in the case group of 60.0%. In the table above it is known that respondents in the age category <= 49 years are 100.0% compared to the control group of 94.0%. Farmers who have a history of disease are dominated in the case group at 36.0% compared to the control group at 80.0%. The farmers who have normal body mass index were more in the control group which was 66.0% as depicted in the table above. Farmers who have the habit of smoking every day are more in the case group which was 64.0% compared to the control group 54.0%. Farmers who consumed more alcohol are in the infertile group at 44.0% compared to the control group is 30.0%.

Table 1. The characteristics of responden

| Category                      | Group    |     |     |
|-------------------------------|----------|-----|-----|
|                               | Case     |     |     |
|                               | f        | %  |     |
| Education                     |          |    |     |
| Never school                  | 1        | 4.0| 1   | 2.0|
| Not finish elementary school  | 2        | 8.0| 10  | 10.0|
| Elementary school             | 15       | 60.0| 18  | 36.0|
| Junior high school            | 4        | 16.0| 13  | 26.0|
| High school                   | 2        | 8.0 | 7   | 14.0|
| University                    | 0        | 0.0 | 1   | 2.0|
| Other                         | 1        | 4.0 | 0   | 0.0|
| Age                           |          |    |     |
| >49 years old                 | 0        | 0.0 | 3   | 6.0|
| <=49 years old                | 25       | 100.0| 47  | 94.0|
| History of Diseases           |          |    |     |
| Yes                           | 9        | 36.0| 9   | 18.0|
| No                            | 16       | 64.0| 41  | 82.0|
| Body Mass Index               |          |    |     |
| Thin                          | 4        | 16.0| 1   | 2.0|
| Normal                        | 15       | 60.0| 33  | 66.0|
| Obesity                       | 6        | 24.0| 16  | 32.0|
| Smoking behaviour             |          |    |     |
| Yes, every day                | 16       | 64.0| 27  | 54.0|
| Yes, sometimes                | 3        | 12.0| 4   | 8.0|
| No, but smoking everyday      | 1        | 4.0 | 5   | 10.0|
| before                        |          |    |     |
| No, but smoking at certain time before | 5       | 20.0| 5   | 13.3|
| Never                         | 0        | 0.0 | 9   | 18.0|
| Consumption of alcohol        |          |    |     |
| Yes                           | 11       | 44.0| 15  | 30.0|
| No                            | 14       | 56.0| 35  | 70.0|
| Total                         | 25       | 100.0| 50  | 100.0|
Table 2. Description of use of pesticides

| Category                                             | Case | Group |
|------------------------------------------------------|------|-------|
| Number of pesticides                                 | f    | %     |
| >5                                                   | 7    | 28,0  |
| <=5                                                  | 12   | 24,0  |
| Total                                                | 25   | 100   |
| Frequency of spraying pesticides in a week           | f    | %     |
| >=3                                                  | 20   | 80,0  |
| <3                                                   | 5    | 20,0  |
| Total                                                | 25   | 100   |
| Pesticides Dosage                                    | f    | %     |
| >183,12 cc (Mean)                                    | 11   | 44,0  |
| <183,22 cc (Mean)                                    | 14   | 56,0  |
| Total                                                | 25   | 100   |
| Duration become a farmer                             | f    | %     |
| > 10 years                                           | 15   | 60,0  |
| ≤ 10 years                                           | 10   | 40,0  |
| Total                                                | 25   | 100   |
| Farming activities                                   | f    | %     |
| All                                                  | 25   | 100   |
| Only spray pesticides                                | 0    | 0,0   |
| Total                                                | 25   | 100   |
| Use of Personal Protective Equipment                 | f    | %     |
| Non use                                              | 22   | 88,0  |
| Use                                                  | 3    | 12,0  |
| Total                                                | 25   | 100   |
| Distance between storage and living room             | f    | %     |
| 5 m                                                  | 15   | 60,0  |
| >5 m                                                 | 10   | 40,0  |
| Total                                                | 25   | 100   |
| The direction of the wind is opposite to the direction of the spraying | f    | %     |
| Yes                                                  | 7    | 28,0  |
| No                                                   | 18   | 72,0  |
| Total                                                | 25   | 100   |
| Re-Spraying                                          | f    | %     |
| Yes                                                  | 13   | 52,0  |
| No                                                   | 12   | 48,0  |
| Total                                                | 25   | 100   |
| Use the same clothes when spraying with daily clothes | f    | %     |
| Same                                                 | 17   | 68,0  |
| Different                                            | 8    | 32,0  |
| Total                                                | 25   | 100   |
| Hand washing behavior with soap after spraying pesticides | f    | %     |
| No                                                   | 23   | 92,0  |
| Yes                                                  | 2    | 8,0   |

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The number of pesticides used show that farmers who used the type of pesticide >5 are more in the case group which was 28.0% compared to the control group 24.0% as depicted in the table above. The frequency of spraying in a week category show that the frequency of spraying more than 3 times a week is found in the control respondents by 84.0% compared to case respondents by 80.0%. In the category of pesticides dosage uses known that the use of high dosage of pesticides (> 183.12 cc) was most in the control group which was 66.0% compared to case group 44.0%. The table above shows the agricultural activities that cover all activities from planting to harvest are mostly carried out by the case group which was 100% compared to 97.3% control group. The Personal protective equipment (PPE) is not widely used for spraying in the group of the case was 88.0% in contrast to controls at 80.0%. The category of storage distance of shallots whether less than equal to 5 meters in the same percentage both case and control group was equal to 40.0%. The direction of the wind is opposite to the direction of the spraying was higher for the case group, which was 28.0% compared to the control of 26.0%. Re-spraying after harvest was more performed in case group by 52.0% compared to 40% in the control group. Based on the table above, using the same clothes when spraying with the clothes worn at daily was more in the control group 72.0%. The behavior of not handwashing with soap after spraying pesticides was mostly carried out by respondents case group at 92.0%.

The results of the study obtain data that most of the subject's education was elementary school graduates (40%). The male farmer education is still low. To increase their knowledge of the use of pesticides, assistance and training should be provided. These farmers are considered healthy because most of them do not have a history of chronic disease (76%). BMI (Body Mass Index) is mostly normal (64%) with an average of 22.8 and this is normal (18.5-25). Male farmers mostly smoke (66.7%) 57.3% smoke every day. They do not drink alcohol (65.3%) although there is as many as 34.7% drink alcohol. People in the village have the habit of drinking alcohol at a wedding celebration. The average frequency of spraying kali 3 times a week and the use of high doses of pesticides (> 183.12 cc) was most in the control group at 66.0% compared to case respondents 44.0%. Spraying and excessive use of pesticides will affect sperm density and motility, inhibition of spermatogenesis, reduction in testicular weight, reduction in sperm count, motility, viability and density, and accelerate damage to sperm DNA, and increase sperm morphological abnormalities. Damage to DNA integrity can affect sperm morphology. There was a significant decrease in semen quality (sperm count, motility and percentage of teratospermia) in farmers exposed to pesticides. These farmers have a 3-9 times greater risk of having abnormal semen parameters.[10]

Agricultural activities that included all activities from planting to harvest are mostly carried out by the case group 100% compared to 97.3% control respondents. The average shallot man farmer is engaged in planting shallots from the beginning to the end of harvesting. They rarely lease their land to other people. Field Extension Officers (PPL) always provide understanding related to the use of Personal Protective Equipment (PPE). But they did not obey. Much personal protective equipment (PPE) is not used when spraying. The use of spraying clothes that are the same as clothes worn at home is more in the control of subjects that was 72.0%. The use of adequate personal protective equipment can reduce the exposure of pesticides to spray farmers. Based on the Regulation of the Minister of Manpower and Transmigration of the Republic of Indonesia Number Per.08 / Men / VII / 2010. Personal protective equipment (PPE) is a device that can protect a person whose function is to isolate part or the whole body from potential hazards in the workplace.[11]

After the harvest, harvested shallots that are for sale or used for seedlings are brought home. The onion is still sprayed with pesticides to avoid the decay process. Storage distance of shallots ≤ 5 meters from the gathering place of the family. Post-harvest re-spraying was mostly performed in cases of 52.0% compared to 40% in controls. When spraying, farmers do not care about the direction of the wind. Based on research data which stated that most of the opposite wind direction when spraying was more in case respondents 28.0% compared to controls of 26.0%.
Farmers who spray do not pay attention to the direction of wind will cause increased exposure to pesticides and reduce blood cholinesterase levels. This will have an impact on health (poisoning).[12] This is also exacerbated by their unhealthy behavior, most of which do not wash their hands with soap after spraying (92.0%).

4. Conclusion
Average spraying frequency ≥ 3 times a week. Use of high dosage of pesticides (> 183.12 cc). Agricultural activities which include all activities from planting to harvesting were mostly performed. Much personal protective equipment (PPE) is not used when spraying. Storage distance of shallots ≤ 5 meters from the gathering place of the family. Farmers when spraying pays less attention to the direction of the wind. Post-harvest re-spraying is performed more in cases by 52.0% compared to 40% in controls. The use of spraying clothes that are the same as clothes worn at home was more in the control group that was 72.0%. The behavior of not handwashing with soap after spraying is carried out in cases group 92.0%. Still need information and education communication related to the use of pesticides, the use of Personal Protective Equipment (PPE).

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