

## INTISARI

Abu vulkanik pada erupsi Gunungapi Merapi 2010 mengakibatkan kerugian besar terhadap sektor pertanian akibat persebarannya yang sangat luas. Deposit abu vulkanik pada ketebalan tertentu dapat mengakibatkan kerusakan pada segala jenis tanaman, salah satunya padi. Penelitian ini bertujuan menghitung potensi kerugian yang disebabkan deposit abu vulkanik pada tanaman padi menggunakan multi-skenario nilai *Volcanic Explosivity Index* (VEI) pada erupsi yang mungkin terjadi di Gunungapi Merapi. Studi ini penting dilakukan agar pemberian bantuan dana rehabilitasi pada tanaman padi terdampak bencana dapat tepat sasaran dan tidak berlebihan. Estimasi kerugian pada tanaman padi akibat abu vulkanik dilakukan dengan: (1) melakukan simulasi multi-skenario VEI sebaran abu vulkanik pada kejadian erupsi, (2) menganalisa sebaran kawasan pertanian tanaman padi di Desa Srumbung sebagai studi area, dan (3) menghitung kerugian pada pertanian tanaman padi pada satu kali masa tanam berdasar simulasi erupsi gunungapi.

Simulasi sebaran abu vulkanik dilakukan menggunakan program simulasi *Ash Fallout* berdasar skenario erupsi Gunungapi Merapi yang pernah terjadi. Kawasan tanaman padi di Desa Srumbung ditentukan berdasar analisa pada foto udara dari *Unmanned Aerial Vehicle* (UAV). Sedangkan penentuan kerugian berdasar nilai aset tanaman padi berdasar jenjang umur tanaman yang ditentukan melalui wawancara ke petani padi.

Simulasi sebaran abu vulkanik dengan ukuran partikel rentang 0,0625 – 4 mm pada skenario VEI 1 menggunakan *Ash Fallout* menghasilkan luasan terdampak 3,04 km<sup>2</sup> di sekitar puncak dan tidak mencapai Desa Srumbung. Pada VEI 2 terdapat 1,27 km<sup>2</sup> area Desa Srumbung terdampak abu vulkanik dengan ketebalan abu 1 – 5 mm. Pada VEI 3 seluruh Desa Srumbung terdampak abu dengan ketebalan 5 – 10 mm (0,96 km<sup>2</sup>) dan ketebalan 1 – 5 cm (1,08 km<sup>2</sup>). Pada VEI 4 seluruh Desa Srumbung terdampak abu dengan ketebalan 1 – 5 cm (1,45 km<sup>2</sup>) dan ketebalan 5 – 10 cm (0,5 km<sup>2</sup>) dengan luasan area terdampak abu seluruhnya sekitar 4 kali lipat (642,14 km<sup>2</sup>) dari VEI 3 (168,64 km<sup>2</sup>). Analisa foto udara menunjukkan Desa Srumbung memiliki 12,95 ha terdiri atas 6,86 ha sawah padi tahap 1 (awal), 5,8 ha tahap 2 (dewasa), dan 0,3 ha tahap 3 (siap panen). Kerugian pada tanaman padi sebanding dengan ketebalan abu dengan estimasi pada VEI 2 Rp. 3.322.758, VEI 3 Rp. 32.609.049, dan VEI 4 Rp. 106.149.860.

Kata kunci: Tanaman padi, Estimasi kerugian, Abu vulkanik, Foto udara, simulasi *Ash Fallout*

## ABSTRACT

Volcanic ash in the 2010 Merapi Volcano eruption resulted in huge losses to the agricultural sector due to its very wide distribution. Volcanic ash deposits at certain thickness can cause damage to all types of plants, one of which is rice. This study aims to calculate the potential losses caused by volcanic ash deposits in rice plants using a multi-scenario Volcanic Explosivity Index (VEI) value on eruptions that might occur at Merapi Volcano. This study must be carried out so that the provision of funds for the rehabilitation of disaster-affected rice plants can be on target and not excessive. Estimation of losses to rice due to volcanic ash is done by (1) simulating a multi-scenario VEI of volcanic ash distribution on eruption events, (2) analyzing the distribution of rice farming areas in Srumbung Village as an area study, and (3) calculating losses in paddy farming at one planting time based on volcanic eruption simulation.

The volcanic ash distribution simulation was carried out using the Ash Fallout simulation program based on the Merapi Volcano eruption scenario that had occurred. The rice crop area in Srumbung Village was determined based on an analysis of aerial photographs from the Unmanned Aerial Vehicle (UAV). While the determination of losses based on the value of the assets of rice plants based on the age of the crop determined through interviews with rice farmers.

The simulation of volcanic ash distribution with a particle size range of 0,0625 - 4 mm in the VEI 1 scenario using Ash Fallout resulted in an area of 3,04 km<sup>2</sup> around the peak and did not reach Srumbung Village. In VEI 2 there are 1,27 km<sup>2</sup> in the area of Srumbung Village affected by volcanic ash with ash thickness of 1 - 5 mm. In VEI 3 the entire Srumbung Village was affected by ash with a thickness of 5 - 10 mm (0,96 km<sup>2</sup>) and a thickness of 1 - 5 cm (1,08 km<sup>2</sup>). In VEI 4 the entire Srumbung Village was affected by ash with a thickness of 1 - 5 cm (1,45 km<sup>2</sup>) and a thickness of 5 - 10 cm (0,5 km<sup>2</sup>) with the total area affected by ash approximately 4 times (642,14 km<sup>2</sup>) from VEI 3 (168,64 km<sup>2</sup>). Aerial photo analysis shows Srumbung Village has 12,95 ha consisting of 6,86 ha stage 1 (initial) paddy fields, 5,8 ha stage 2 (mature), and 0,3 ha stage 3 (ready for harvest). Loss on rice plants is proportional to ash thickness with an estimate of VEI 2 Rp. 3.322.758, VEI 3 Rp. 32.609.049, and VEI 4 Rp. 106.149.860.

Keywords: Rice plants, Loss estimation, Volcanic Ashfall, Aerial photograph, *Ash Fallout* simulation