

SISTEM DIAGNOSIS PENYAKIT TANAMAN BAWANG MERAH BERBASIS WEB MENGGUNAKAN METODE *CASE BASED REASONING* DAN *CERTAINTY FACTOR*

ABSTRAK

Tanaman bawang merah merupakan salah satu komoditas hortikultura yang memiliki nilai ekonomi tinggi di Indonesia. Namun, produktivitas bawang merah sering mengalami penurunan akibat serangan berbagai penyakit yang sulit dikenali pada tahap awal. Keterbatasan akses terhadap pakar juga menjadi kendala dalam memperoleh diagnosis yang cepat dan akurat. Penelitian ini bertujuan mengembangkan sistem diagnosis penyakit tanaman bawang merah berbasis web menggunakan metode *Case Based Reasoning* (CBR) dan *Certainty Factor* (CF). Metode CBR digunakan untuk mencari kasus lama yang memiliki tingkat kemiripan dengan gejala yang dimasukkan pengguna, sedangkan metode CF digunakan untuk menghitung tingkat keyakinan terhadap hasil diagnosis berdasarkan pengetahuan pakar. Penelitian ini menggunakan metode *Research and Development* (R&D) dengan model pengembangan *Expert System Development Life Cycle* (ESDLC) yang meliputi tahap penilaian keadaan, akuisisi pengetahuan, perancangan, implementasi, serta pengujian dan evaluasi sistem. Basis pengetahuan sistem diperoleh melalui studi literatur dan validasi pakar dari bidang Ilmu Hama dan Penyakit Tumbuhan (IHPT). Sistem mampu mendiagnosis lima penyakit utama pada tanaman bawang merah, yaitu Layu Fusarium, Bercak Daun, Antraknosa, Embun Bulu, dan Mosaik Bawang. Selain fitur diagnosis, sistem juga menyediakan fitur unggah foto tanaman sebagai dokumentasi serta fitur konsultasi dengan pakar pertanian. Sistem dirancang responsif sehingga dapat diakses melalui komputer maupun *smartphone*. Pengujian akurasi menggunakan *Confusion Matrix* terhadap 30 data uji menghasilkan nilai *accuracy* sebesar 96%, *precision* sebesar 90%, *recall* sebesar 90%, dan *F1-score* sebesar 90%. Pengujian *usability* berdasarkan standar ISO 9241-11 menunjukkan nilai *effectiveness* sebesar 95,71%, *efficiency* sebesar 0,0894 goals/sec, dan *satisfaction* berdasarkan *System Usability Scale* (SUS) sebesar 84,25 yang termasuk kategori sangat baik. Hasil penelitian menunjukkan bahwa sistem mampu memberikan diagnosis yang mendekati hasil pakar serta memiliki tingkat *usability* yang baik sehingga layak digunakan sebagai alat bantu diagnosis penyakit tanaman bawang merah.

Kata Kunci : Diagnosis Penyakit Tanaman, Bawang Merah, *Case Based Reasoning*, *Certainty Factor*, Sistem Pakar.

WEB BASED SHALLOT PLANT DISEASE DIAGNOSIS SYSTEM USING THE CASE BASED REASONING AND CERTAINTY FACTOR METHODS

ABSTRACT

*Shallots (*Allium ascalonicum* L.) are a horticultural commodity with high economic value in Indonesia. However, their productivity is often reduced by diseases that are difficult to identify at an early stage. Limited access to experts also hinders farmers from obtaining fast and accurate diagnoses. This study aims to develop a web-based shallot disease diagnosis system using the Case Based Reasoning (CBR) and Certainty Factor (CF) methods. CBR is used to identify previous cases with the highest similarity to user-input symptoms, while CF determines the confidence level of the diagnosis based on expert knowledge. This research employed the Research and Development (R&D) method with the Expert System Development Life Cycle (ESDLC) model, which includes situation assessment, knowledge acquisition, system design, implementation, testing, and evaluation. The knowledge base was developed through literature studies and validated by an expert in Plant Pest and Disease Science (IHPT). The system can diagnose five major shallot diseases: Fusarium Wilt, Purple Blotch, Anthracnose, Downy Mildew, and Shallot Mosaic Disease. In addition, it provides plant photo upload and expert consultation features and can be accessed through computers and smartphones. Accuracy testing using a Confusion Matrix on 30 test cases resulted in an accuracy of 96%, precision of 90%, recall of 90%, and an F1-score of 90%. Usability testing based on ISO 9241-11 produced an effectiveness score of 95.71%, efficiency of 0.0894 goals/sec, and a System Usability Scale (SUS) score of 84.25, categorized as excellent. The results indicate that the developed system can provide diagnoses that closely match expert assessments and is suitable as a decision-support tool for shallot disease diagnosis.*

Keywords: Shallot Disease Diagnosis, Case Based Reasoning, Certainty Factor, Expert System, Web-Based System.