

## **Herbicide Resistance Awareness and Management Practices Among Oil Palm Smallholders in Malaysia: Regional Disparities and Implications**

CHUAH TSE SENG, NAZALYYUSSMA YUSOP, SUFIAH AHMAD PAUZI, NENI KARTINI  
CHE MOHD RAMLI, SITI NUR ANISAH AANI, MOHD SAIFUL AKBAR MOHAMAD SAHAL,  
JOSEPHINE TENING PAHANG AND EDISON PURBA

*Herbicide-resistant weeds threaten oil palm productivity, yet smallholder practices remain less documented than those of estates. This study surveyed 102 smallholders (81 in Peninsular Malaysia; 21 in Sabah and Sarawak) to evaluate sociodemographic, awareness, herbicide use, and constraints. Overall awareness of resistance was high (74% Peninsular; 71% Sabah and Sarawak), but knowledge of herbicide site-of-action classification was low (36% & 33%). Distinct regional differences emerged. In Sabah and Sarawak, smallholders relied heavily on pre-emergent herbicides (86–95%), mainly diuron, reflecting a proactive but chemically intensive strategy. Peninsular Malaysia smallholders applied pre-emergent herbicides less often (40–49%) and depended on glyphosate post-emergence (73–86%), often with dose reduction (14%), a practice associated with resistance evolution. Herbicide cost was the main constraint across regions; however, Peninsular respondents more frequently cited difficulty understanding product labels. Eleusine indica was the most problematic weed reported (84% Peninsular; 76% Sabah/Sarawak). These findings show Peninsular Malaysia smallholders adopt practices that elevate resistance risk, while those in Sabah and Sarawak follow a more structured but chemical-dependent approach. Region-specific extension is needed: promoting affordable integrated pre-emergent options in Peninsular Malaysia and encouraging rotation and mixtures in Sabah and Sarawak to sustain weed management.*

*Keywords: Diuron, Eleusine indica, glyphosate, herbicide resistance.*



1919