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FARMERS' PERCEPTION OF WEED INFESTATION AND MANAGEMENT IN SOME AGRARIAN COMMUNITIES OF SOUTHERN NIGERIA

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ABSTRACT

Weed infestation is detrimental to crop yield and quality, limits farm size, increases the cost of production, reduces profit, and impairs farmers' livelihood. This study was conducted to assess the weed infestation status based on the farmers' perspective, the control measures adopted, and the potential weed problem in some agrarian communities in Derived Savanna agroecology. A Structured questionnaire was administered to one hundred and ten (110) farmers. Data were analyzed using the Descriptive analysis method. Most (75.5%) of the farmers were male and almost half (43.6%) had the mean farming experience of 22.46±9.99, while 46.4 percent had within 11-15 years of formal education. However, the mean age was 49.93±10.70 years. Most farmers (90%) had the lowest income level (₦10000 – ₦50000). Farmers (25% – 50%) identified Cyperus rotundus, Imperata cylindrica, Tridax procumbens, Commelina bengalensis, Emilia sonchifolia, Axonopus compressus, Tithonia diversifolia, Pennisetum purpureum, and Euphorbia heterophylla as problematic weeds. Farmers understood and adopted manual weeding (100 %), and chemical (98.2 %) weed control methods. However, few farmers (2.7%) knew or adopted the concept of integrated weed management and biological weed control (3.6 %) methods for weed management. The farmers' perception of weed infestation might be useful in early warning systems for preventing and managing noxious weeds and ensuring sustainable crop production. The training of farmers on the principles of integrated weed management (IWM) for effective weed control, improved crop yield, and livelihood is essential.

Keywords: weediness, weed control methods, integrated weed management.

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INTRODUCTION

Weeds are a menace with significant yield reduction in cropping systems. Yield reduction due to weed competition varies from country to country by weed species present, and agronomic practices (Arouna et al., 2021; Naeem et al., 2022). Weeds are found everywhere causing several billions of dollars' worth of crop losses annually with the global cost of control running into many billions of dollars (Abouziena & Haggayi, 2016). Weed infestation in arable crops is not markedly noted by farmers especially in the early stage of crop growth when damage is initiated to crop plants and its subsequent yield reduction. Oerke (2006) estimates that, on a global basis, 37% of attainable soybean production is endangered by weed competition, compared to 11%, 11%, and 1% by pathogens, animal pests, and viruses, respectively. Weeds interfere through competition for resources, such as water, light, soil nutrients, carbon dioxide, and physical space, amongst other factors. Weeds aggravate multiple stressors, causing biochemical and physiological modifications in competing crop plants (Caverzan et al., 2019). Hence, priority crop yield losses as a result of weed competition are estimated to be 40–90% in cereals, 50–60% in legumes 50–53% in oilseeds, and 65–91% in root and tuber crops (Kehinde, 2002; Ado, 2007; Imoloame, 2014; Amosun et al., 2015; Aluko, 2019; Amosun et al., 2021). The presence of weeds during the soybean harvest could contaminate seeds and reduce seed quality and harvest efficiency (Werner et al., 2014). Weed infestation in cassava has been reported to be critical during the first three to four months of growth, and poor weed management is one of the major factors reducing tuber yield (Chethan et al*.,* 2019). In mixed cropping systems, weed interference may account for tuber yield losses between 30 and 40% (Orkwor et al., 1994); in sole cassava cropping, yield losses can be as high as 54 to 90% (Akobundu, 2006; Onochie, 1974).

Several weed management methods, i.e., cultural, chemical, mechanical, and biological are opted to suppress weeds in cropping systems. The weed management strategies in cropping systems influence overall crop performance. Manual weeding demands more than 70% of household labor, and hoeing has become very expensive because of labor scarcity (Chikoye et al., 2000; Ellis-Jones et al., 2003). As a result, farmers tend to restrict the cropping of farmlands to a manageable size, gradually reducing the crop yield per farmer and significantly reducing annual crop yield in farming communities. Previous studies have also shown that chemical control can be cheaper than hoeing (Chikoye et al., 2000; Ellis-Jones et al., 2003). Chemical weed control in maize resulted in a 77 - 97% increase in grain yield over weed-infested maize fields (Aluko, 2019).

Weed management decisions may be influenced by the farmers' perception of the severity of infestation and the value attached to the crop cultivated. This might determine the success of cropping activities and the obtainable profit. Viewing weed incursion on farmland from the right perspective by stakeholders through anticipation of appropriate management techniques will inform prompt decision-making in weed management. This will enhance crop productivity, and improve income and farmers' livelihood. The study was conducted to know the problematic weed species, weed infestation severity, and management options known and adopted by the farmers.

MATERIALS AND METHODOLOGY

The survey was conducted in some agrarian communities of Ido Local Government Area of Oyo State in 2019 to evaluate the farmers' perceived weed problem, the severity of the infestation, and the adopted weed management techniques among the farmers. The crops and cropping patterns among farmers in the study area (Olokgboro, Araromi, Alapata, Aba-Aremu, Omi-Adio Onigbinde, and Akufo) were also identified. A Simple random sampling technique was used to select seven communities from the local government area out of

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thirty-three in the State. In the selected agrarian communities, 15% of crop farmers were randomly selected which gave 110 respondents and the data were collated and analyzed using descriptive statistics. The cropping systems and type of crops cultivated by the farmers are reported in Table 1.

RESULTS AND DISCUSSION

The youngest group of farmers (20 – 30 years old) were the fewest (1.8 %) involved in cropping activities in the study (Table 2). The oldest group of farmers (20) in the study were above 60 years of age representing 18.2% of the respondents. Previous studies showed that older farmers are more risk-averse, less willing to experiment, less likely to be influenced by social expectations, and more focused on financial performance (Brown et al., 2019).

The most frequent age group of 41-50 years accounted for almost half (49.93%) of the farmers within this age range, with a mean of 49.93±10.70 years, this shows that young people's interest in farming has been reduced to an alerting rate. This corroborates the findings of Fasina (2013), who opined that a large mass of aged farmers are ones involved in farming, which is invariably not a good index to technology adoption and productivity. FAO (2014) further stated that while most of the world's food is produced by (aging) smallholder farmers in developing countries, older farmers are less likely to adopt the new technologies needed to sustainably increase agricultural productivity, and ultimately feed the growing world population while protecting the environment. This is becoming a global issue as agriculture in China is also facing an aging workforce which could negatively impact the industry (Guo et al., 2015). He reported that the combination of changes in the composition of the working-age households indicates that 58.53 percent of the agricultural producers will likely quit. Fasina (2013), further stated that the majority of the farmers reduced the scope of production by (69.5%) and hours (66.7%) of operation as they grew older. This is a potential threat to the future of agricultural development, food security, and the cost of living.

A very low (1.8%) percentage of most agile young farmers might be influenced by poor outlook of cropping activities, drudgery especially weeding, low income among the majority of the farmers (10,000 -50,000), and delayed return on investment in crop production. This active group might also be involved in other quick money-making ventures. In most urban centres, especially in Nigeria, those aged 20-30 may be in training in other fields aside from agriculture. This group may not support household labour in the cropping system as they are not available around farmsteads as represented in the study (1.8 %). Brown et al., (2019) reported that young farmers are less risk-averse, more influenced by social norms, and less focused on finances. This further explains why young farmers are scanty in cropping activities. In a labour-intensive cropping system, young farmers are not psychologically prepared to engage in cropping activities due to drudgery. A widespread psychological rejection of farming by the young generation was ascertained in China (Jianzhi et al., 2023). This may account for the low percentage of young farmers reported in this study.

The age group of 41-50 was most frequent in the cropping system (40.9%) in the study areas. This falls within the economic productive age. Although, some of these farmers may

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have other sources of income. This may inform their scale of crop production as both workmanship and devotion to cropping are limited. This may give credence to the report of Fasina (2013), that the majority of the farmers reduced the scope of production by (69.5%) and hours (66.7%) of operation as they grew older.

Male farmers in cropping activities are about three times more than female farmers (Table 2). This might result from the perceived strain and drudgery associated with cropping in the study area. This may cause a shift of the female folks to other less stressful profitable ventures like marketing and processing of farm produce, aside from some cultural and religious beliefs prohibiting women from vocations. The traditional land ownership and tenure systems might reduce the participation of women in cropping activities. This might explain the low percentage of female farmers recorded. In the face of recent insecurity in agrarian communities in Nigeria, cropping activities might also be limited to male folks, thereby reducing the number of women in cropping activities. However, higher participation of women in agriculture in Edo State was earlier reported by Uzokwe et al., (2017). The authors reported a lower grand participation mean of 2.94 and participation index of 0.74 for men, while the female folks in Edo state had 3.52 and 0.88 grand participation and participation index respectively. Meanwhile, in 2013, women represented 24 % of European Union (EU) farmholders in organic farming, and they occupied 13 % of the EU area devoted to organic farming (EIGE, 2017). This is far lower than the number of men engaging in cropping. The lower number of female farmers in the study areas may be associated with the socio-cultural ethics and this varies from place to place.

Almost half (43.6%) had between 11 and 20 years of farming experience while 90.0% earned between ₦10,000 and ₦50,000 with a mean of 26081.82±20995.91 per month. Income to a greater extent is a motivational factor in farmers' technology adoption, with low income probably due to low yield, there may be low adoption of technology innovation. This supports the study of Khumalo et al., (2019), which states that the income of farmers has a significant influence on their interest in the use of improved technologies. The findings also show that most (46.4%) of the farmers had 11 to 15 years of formal education and with improvement in knowledge through education, there will be an increase in technology adoption and cropping practices. This agreed with the findings of Usman et al., (2021), which opined that most farmers involved in complete farming are average-lettered people.

The size of the household can be a determining factor for cropping activities and the size of the land under cultivation. Households of 0 - 5 (64.5%) was the most common among the respondents. This almost doubled the 6 -10 household size (32.7%). The largest household size of more than 10 was rare among farmers (2.7%). This might be influenced by location, religious beliefs, and social-economic factors. Though, household farm labour supply is of the essence in the face of scarcity of manpower to undertake routine cultural practices in cropping activities, especially weed management, however, migration of rural dwellers to urban centres might deter the use of family members as farmhands.

Table 3 shows the weed flora composition and severity of infestation as perceived by farmers in some agrarian communities of Ido Local Government. Thirteen weed species were

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identified to be of concern to the farmers. *Cyperus rotundus, Imperata cylindrica, Tridax procumbens, Emilia sonchifolia, Commelia bengalensis, Tithonia diversifolia, Axonopus compressus, Euphorbia heterophylla, Pennisetum purpureum,* and *Elusine indica* had severity range of 20 to 54 %. These were reported by the majority of the farmers across locations as weeds of concern to their cropping activities. Most weeds identified by farmers were annual weeds. However, the perennial weeds of concern (*Cyperus rotundus*, *Imperata cylindrica, commelina bengalensis, and Pennisetum purpureum*) were reported by the farmers despite the continuous cropping system practiced by the majority of the farmers. These did not succumb to annual cultivation practices. This might be due to their mode of propagation and weed management options adopted by the farmers (Tables 1 and 3). *Cyperus rotundus*, *Imperata cylindrica, Commelina bengalensis, and Pennisetum purpureum* had high potential severity as they were rated by a good percentage of farmers (38 – 54%) as moderately severe weeds. This may be a future threat to cropping activities if appropriate control method(s) are not anticipated to suppress these weeds. *C. rotundus* can multiply rapidly through tubers which can be greatly accelerated by soil tillage. It is one of the most intractable weed problems in rice due to its perennial nature (Akobundu & Akagwa, 1991). Tubers and seeds can remain dormant to survive periodic flooding or dry seasons, making the weed very difficult to control. This is in line with the perception of many farmers (50%) in the study areas. Weed management practices commonly adopted (Manual and Chemical methods) may not suppress *C. rotundus* due to its perennial nature.

Imperata cylindrica amongst other identified problematic weeds has been identified as the 7th world's worst weed and a major menace in cropping systems in a wide range of agroecologies (Holm et al., 1977; Smith 1997). Speargrass (*Imperata cylindrica*) is a dominant weed in some parts of the Derived savanna agroecology and southern Guinea savanna of Oyo State (Aluko et al., 2018). Chikoye et al., (1999) reported that more than 50% of the farmers surveyed in West Africa, identified *I. cylindrica* as the most important weed. This gave credence to the perception of the farmers in the study as 48% of the farmers identified *Imperata cylindrica* as a problematic and severe weed in the cropping systems. This is in line with the perception of the farmers that speargrass is a problematic weed in the study area. *Imperata cylindrica* infestation has a significant agronomic and economic impact as it reduces crop yield and quality, discourages cropping by causing injury to the skin, increases labour requirements, and increases the presence of pathogens and insects in economic crops (Chikoye et al., 2000).

Commelina bengalensis, commonly known as Bengal dayflower, is a weed that can significantly affect maize production if not managed effectively. *Commelina bengalensis* is fast-growing and a prolific seed producer (Walker & Evenson, 1985). It competes with arable crops for nutrients, water, and light. The weed can outcompete young maize plants, especially in the early stages of growth, leading to stunted growth and reduced yields. *C. benghalensis* can regenerate from stem fragments (Budd et al., 1979). These characteristics, plus a high degree of tolerance to glyphosate, a common herbicide amongst rural farmers (Culpepper et al., 2004), make *C. benghalensis* exceptionally difficult to control in agronomic systems when it becomes established. Hence, the perception of *C. bengalensis* as a

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problematic weed in these agrarian communities by the farmers is justified. The prevalence of *C. bengalensis* has posed serious challenges in cotton (*Gossypium hirsutum* L.) and peanut (*Arachis hypogaea* L.) production (Webster & Sosnoskie, 2010), as infestations, have commonly caused 60% to 100% yield reductions (Webster et al., 2007; Webster et al., 2009).

The presence of problematic weeds can influence crop rotation and management practices. Crop farmers may need to adapt their crop rotation strategies and weed management techniques to effectively control the growth and spread of these weeds. A shift in cropping activities and weed management may influence unfavourable weed flora dynamics and competition that may widen the dispersal corridor and aggravate the invasiveness of problematic weeds. Hence, appropriate cropping and weed control methods should be anticipated to prevent potentially severe weeds from attaining endemic status.

Table 4 shows the weed control methods adopted among farmers in the study area. The weeding methods adopted among respondent farmers were different and common. This might have been influenced by the level of weed infestation challenges, resources available to the farmers, years of farming experience, and the farmers' knowledge of weed and its management. The majority of the farmers knew and depended on the labour-intensive manual weed control methods. However, the scarcity of labour and the high cost of hired labour might affect the timeliness of cultural practices. However delayed weeding with the attendant yield penalty; increases the cost of crop production, and invariably reduces the profit margin of individual farmers. According to Adigun & Lagoke (2003), labour for manual weeding is scarce and expensive and does not guarantee season-long weed control, especially during the rainy season. Labour-intensive cropping might be responsible for the low percentile (1.8 %) of young farmers (20 - 30 years old) in the communities under investigation.

This was followed by chemical weed control and manual weeding. Dependence on these weed control methods (manual and chemical) might influence the farm size especially where labour is scarce for weeding and other cultural practices. This in turn might influence the scope of cropping and income from the cropping activities. The use of common herbicides was reported to be well adopted by rural workers because they are of low cost, replace manual weeding, and improve yields (Haggblade et al., 2017). This might be responsible for a high percentage of farmers applying chemicals for weed control in these communities.

Though, some farmers adopted more than one weed management option in the form of integrated weed management (IWM), however, they had no clear knowledge of IWM as a weed management option. Hence, few farmers (2.7 %) adopted IWM in principle as recorded in the study unlike manual (100 %) and chemical (98.2 %) weeding methods that had higher adoption percentages. Biological weed control was not popular among the farmers as only 3.6 % of the respondents adopted the method. The arable cropping system that is common practice among the farmers may not support the grazing of livestock around farmsteads which is the basic biological weed control method. The use of other complex biological weed control organisms may be too cumbersome and expensive for resource-challenged farmers who formed the majority of the farmers in the study areas, based on their

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income (Table 2). This may explain the low adoption percentage of biological weed control aside from the know-how of the technology that is not available to farmers, making it unpopular among the farmers.

CONCLUSION AND RECOMMENDATION

The most experienced farm hands are few and aged. There should be a shift from a labour-intensive cropping system to modern cropping practices to encourage younger farmers and potential investors to venture into the cropping business. Weed infestations in crop fields are mostly underestimated. However, a greater percentage of crop yield losses occurred due to weed infestation. Farmers need more information on weed management technologies for proper management of weeds. Farmers' perception of their weed infestation problems may be useful in an early warning system (EWS) for weeds and other pest management. Therefore, measures should be put in place through an early warning system to reverse the infestation trend of weeds-of-concern to farmers to prevent crop yield losses, through the adoption of appropriate integrated weed management (IWM) option. This will improve crop production, food security, and the livelihood of the farmers.

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REFERENCES

Abouziena, H., & Haggag, W. (2016). Weed Control in Clean Agriculture: A review 1. *Planta Daninha*, *34*(2), 377–392. https://doi.org/10.1590/s0100-83582016340200019

Ado S.G. (2007). Weed management needs in Nigeria in the context of the millennium development goals. *Niger Journal of Weed Science, 20*, 67-72.

Akobundu, I.O. (2006). Weed interference and control in white yam (Dioscorea rotundata Poir). *Weed Research, 21*, 267-272. https://doi.org/10.1111/j.1365-3180.1981.tb00127.x

Aluko O.A. (2019). Efficacy of candidate herbicides for post-emergence weed control in Kenaf (Hibiscus cannabinus L.). *Journal of Agriculture and Ecology Research International, 19*(3), 1 - 7. https://doi.org/10.9734/jaeri/2019/v19i330085

Aluko O.A., Smith M.A.K. & Omodele T. (2018). Survey and mapping of speargrass (Imperata cylindrica (L.) Reauschel) invasiveness in two Agroecologies of Nigeria. *European Journal of Agriculture and Forestry Research, 6*(3), 1-10.

Amosun J.O., Aluko O.A. & Adeniyan O.N. (2015). Effect of weed management strategies on maize yield. *International Journal of Agriculture and Agricultural Sciences 2*(1), 018 - 020.

Amosun J.O., Aluko O.A. & Ilem D.O. (2021): Comparative effect of weed control methods on Mexican sunflower (Tithonia diversifolia) in maize. *African Journal of Plant Science, 15*(4), 115-122.

Arouna, A., Devkota, K.P., Yergo, W.G., Saito, K., Frimpong, B.N., Adegbola, P.Y., Depieu, M.E., Kanyi, D.M., Ibro, G., Abdoulaye, A., & Usman, S. (2021). Assessing rice production sustainability performance indicators and their gaps in twelve sub-Saharan African countries. *Field Crops Research, 271*, 108263. https://doi.org/10.1016/j.fcr.2021.108263

Brown, P., Daigneault, A., & Dawson, J. (2019). Age, values, farming objectives, past management decisions, and future intentions in New Zealand agriculture. *Journal of Environmental Management*, *231*, 110–120. https://doi.org/10.1016/j.jenvman.2018.10.018

Budd, G. D. P., Thomas, E.L., & Allison, J. C. S. (1979). Vegetative regeneration, depth of germination and seed dormancy in Commelina benghalensis L. *Rhodesian Journal of Agricultural Research, 17(*2): 151-153, 1979.

Caverzan, A., Piasecki, C., Chavarria, G., Stewart, C., & Vargas, L. (2019). Defenses against ROS in crops and weeds: the effects of interference and herbicides. *International Journal of Molecular Sciences*, *20*(5), 1086. https://doi.org/10.3390/ijms20051086

Chikoye, D., F. Ekeleme & J.T. Ambe (1999): Survey of distribution and farmers' perceptions of speargrass [Imperata cylindrica (L.) Raeuschel] in cassava-based systems in West Africa. *International Journal of Pest Management, 45,* 305-311. https://doi.org/10.1080/096708799227725

Chikoye, D., V. M. Manyong, & F. Ekeleme. (2000). Characteristics of speargrass (Imperata cylindrica)-dominated fields in West Africa: crops, soil properties, farmer perceptions, and management strategies. *Crop Protection, 19*, 481-487. https://doi.org/10.1016/S0261-2194(00)00044-2

Chethan, C. R., V. K. Tewari, A. K. Srivastava, S. P. Kumar, B. Nare, A. Chauhan, & P. K. Singh (2019). Effect of herbicides on weed control and potato tuber yield under different tuber eye orientations. *Indian Journal of Weed Science, 51*(4), 385-389. https://doi.org/10.5958/0974-8164.2019.00080.7

Culpepper, A. S., J. T. Flanders, A. C. York, & T. M. Webster (2004). Tropical spiderwort (Commelina benghalensis) control in glyphosate-resistant cotton (Gossypium hirsutum). *Weed Technology, 18*, 432-436. https://doi.org/10.1614/WT-03-175R

European Institute for Gender Equity (2017). Gender in agriculture and rural development.

Ellis-Jones, J., J. Power, D. Chikoye, O. K. Nielsen, P. M. Kormawa, S. Ibana, G., Tarawali, U. Udensi, & Avav, T. (2003). *Scaling up the use of improved Imperata management practices in the sub-humid savannah of Nigeria*. In, Proceedings of the 2003 Brighton Crop Protection Conference-Weeds. Farnham, Surrey: British Crop Protection Council. Pp. 1011-1016.

Fasina, O. O. (2013). Farmers' perception of the effect of aging on their agricultural activities in Ondo State, Nigeria. *The Belogradchik Journal for Local History, Cultural Heritage, and Folk Studies, 4*(3), 371-382

Food and Agriculture Organization (2014). Youth and Agriculture: Key Challenges and Concrete Solutions.

Guo, G., Wen, Q., & Zhu, J. (2015). The impact of aging agricultural labor population on farmland output: From the perspective of farmer preferences. *Mathematical Problems in Engineering*, *2015*, 1–7. https://doi.org/10.1155/2015/730618

Haggblade, S., Minten, B., Pray, C., Reardon, T., & Zilberman, D. (2017). The herbicide revolution in developing Countries: Patterns, causes, and implications. *The European Journal of Development Research/European Journal of Development Research*, *29*(3), 533–559. https://doi.org/10.1057/s41287-017-0090-7

Holm, L. G., D. L. Pucknett, J. B. Pancho, & J. P. Herberger (1977). *The World's Worst Weeds. Distribution and Biology*. University Press of Hawaii, Honolulu, HI. 609 p.

Imoloame, E.O. (2014). The effect of different weed control methods on weed infestation growth and yield of soybean (Glycine max) in Southern Guinea Savannah of Nigeria. *Global Journal of Science Frontier Research 13*(6), 20-33.

Jianzhi L., Yangang F., Gang W., Bencheng L., & Ruru W. (2023).The aging of farmers and its challenges for labor-intensive agriculture in China: A perspective on farmland transfer

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plans for farmers' retirement. *Journal of Rural Studies, 100* https://doi.org/10.1016/j.jrurstud.2023.103013

Kehinde, J.K. (2002). Influence of seed rate and weed management practices on weed control and performance of upland rice. *Niger Journal of Weed Science 15,* 1-6.

Khumalo, M., Kibirige D., Masuku M. B., Mloza-Banda, H. R., Mukabwe, W. O., & Dlamini, B. P. (2019). Determinants of Smallholder Maize Farmers' Perception on Use of Improved Weed Control Technologies in Eswatini. *Journal of Sustainable Development, 13*(3), 12-23. https://doi.org/10.5539/jsd.v13n3p12

Naeem, M., Farooq, S., & Hussain, M. (2022). The Impact of Different Weed Management Systems on Weed Flora and Dry Biomass Production of Barley Grown under Various Barley-Based Cropping Systems. *Plants*, *11*(6). https://doi.org/10.3390/plants11060718

Usman, M., Ch, K. M., Ashraf, I., & Tanveer, A. (2021). Factors impeding the adoption of weed management practices in four cropping systems of the Punjab, Pakistan. *International Journal of Agricultural Extension*, *9*(1). https://doi.org/10.33687/ijae.009.01.3588

Oerke, E.C. (2006). Crop losses to pests. *Journal of Agricultural Sciences, 144,* 31-43. https://doi.org/10.1017/S0021859605005708

Onochie, B. E. (1974). The critical period for weed control in yam plots. *Nigerian Agricultural Journal, 11*, 13-16.

Orkwor, G. C., O. U. Okereke, F.O.C. Ezedi, S. K. Hahn, H. C. Ezumah, & I. O. Akobundu. (1994). *The response of yam (Dioscorea rotundata Poir) to various periods of weed interference in an intercrop with maize (Zea mays), okra (Abelmoschus esculentus (L.) Moench), and sweet potato (Ipomoea batatas).* In F. Ofori and S. K. Hahn, Eds. Proceedings of the 9th Symposium of the International Society for Tropical Root Crops, Accra, Ghana: International Society for Tropical Root Crops. Pp. 349-354. https://doi.org/10.17660/ActaHortic.1994.380.54

Smith, M. A.K. (1997). Effects of sampling time and location on growth and development of speargrass, Imperata cylindrica (L.) Raeuschel. *Applied Tropical Agriculture 2*(2): 131-138.

Uzokwe, U. N., Ofuoku, A. U., & Dafe, D. O. (2017b). Male and Female Participation in Selected Agricultural Development Programmes in Edo state. *Journal of Agricultural Extension*, *21*(1), 15. https://doi.org/10.4314/jae.v21i1.2

Walker, S. R., & Evenson, J. P. (1985). Biology of Commelina benghalensis L. in south-eastern Queensland. 1. Growth, development and seed production. *Weed Research*, *25*(4), 239–244. https://doi.org/10.1111/j.1365-3180.1985.tb00640.x

Webster T. M. & L. M. Sosnoskie, (2010). Loss of glyphosate efficacy: a changing weed spectrum in Georgia cotton. *Weed Science, 58*(1): 73-79.

Journal of Agriculture and Food Sciences
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Webster, T. M., Faircloth, W. H., Flanders, J. T., Prostko, E. P., & Grey, T. L. (2007). The critical period of Bengal dayflower (Commelina bengalensis) control in peanut. *Weed Science*, *55*(4), 359–364. https://doi.org/10.1614/ws-06-181.1

Webster, T.M., T. L. Grey, J. T. Flanders, & A. S. Culpepper, (2009). Cotton planting date affects the critical period of Bengal dayflower (Commelina benghalensis) control. *Weed Science, 57(*1): 81-86. https://doi.org/10.1614/WS-08-118.1

Werner, E.L., Curran, W.S., & Lingenfelter, D.D. (2014). Management of eastern black nightshade in agronomic crops: An integrated approach. Pennsylvania: Penn State Extension. (Agronomy Facts 58). P6

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APPENDICES

Table 1: Cropping patterns of farmers in selected agrarian communities in the Derived savanna agroecology of Oyo State

Location	Mixed cropping	Major Sole Crops	Minor sole crops	Tree/fruit crops
Aba-Aremu 7° 30' 57" N, 3° 28' 30" E	Cassava/maize/Celosia	Yam, Pepper	Okro, Jute Mallow	Oil Palm, kola
Alapata, 8° 16' 55" N, 3° 34' 1" E	Cassava/maize Maize/Egusi melon	Maize, Cassava, Okro, Yam, Pepper	Yellow yam Cocoyam	Oil Palm Citrus
Akufo 7° 30'32"N,3° 47' 27" E	Cassava/Maize Maize/egusi melon	Maize, Cassava, Pepper Tomatoes	Cocoyam, okro	Kola Cashew
Araromi 7° 26' 0" N, 3° 42' 0" E	Cassava/maize Yam/pepper	Maize, Pepper Tomatoes	Celosia, Okro	Cashew Citrus Oil palm
Olokogboro 7° 34' 0" N, 3° 45' 0" E	Cassava/maize	Yam, Maize cassava	Okro Cocoyam Amaranthus	Mango Oil palm
Omi-Adio 7°23'38.0"N 3°45'13.0"E	Cassava/Maize Maize/Egusi melon	Maize, Pepper. Jute mallow, Yam Celosia. Fluted-pumpkin. Okro	Cocoyam Celosia Fluted Pumpkin Okro	Oil palm Mango Plantain Banana Citrus
Onigbinde	Cassava/maize	Yam, Pepper Tomatoes	Amaranthus Okro	Oil palm Mango Plantain

Table 2: Socio-economic characteristics of farmers of some agrarian communities in Southern Nigeria (n=110)

Variables	Frequency	Percentages	Mean± SD
Age			
20-30	2	1.8	
31-40	19	17.3	
41-50	45	40.9	49.93±10.70
51-60	24	21.8	
>60	20	18.2	
Sex			
Male	83	75.5	
Female	27	24.5	
Household Size			
0-5	71	64.5	
6-10	36	32.7	1.38±0.54
>10	3	2.7	
Farming Experience(years)			
0-10	10	9.1	
11-20	48	43.6	

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21-30	32	29.1	22.46±9.99
31-40	17	15.5	
41-50	3	2.7	
Years of formal education			
0-5	9	8.2	
6-10	27	24.5	
11-15	51	46.4	
16-20	23	20.9	11.53±5.03
Income			
10000-50000	99	90.0	
51000-100000	9	8.2	26081.82 ± 20995.91
>100000	2	1.8	

Source: Field survey, 2019

Table 3: identified weed species and farmers' perception of severity

Weed spp	Not available*	Not severe*	Severe *	Moderately severe*	Mildly severe*
Elusine indica	0(0)	64(58.2)	22(20)	24(21.8)	0(0)
Imperata cylindrical	0(0)	8(7.3)	48(43.6)	54(49.1)	0(0)
Tridax procumbens	0(0)	9(8.2)	47(42.7)	54(49.1)	0(0)
Axonopus compressus	0(0)	36(32.7)	32(29.1)	42(38.2)	0(0)
Aspilia Africana	101(91.8)	5(4.5)	4(3.6)	0(0)	0(0)
Emilia sonchifolia	14(12.7)	42(38.2)	43(39.1)	9(8.2)	2(1.8)
Sida acuta	17(15.5)	67(60.9)	16(14.5)	10(9.1)	0(0)
Tithonia diversifolia	0(0)	4(3.6)	36(32.7)	28(25.5)	42(38.2)
Cyperus rotundus	*8(7.3)*	*24(21.8)*	*50(45.5)*	*24(21.8)*	*4(3.6)*
Pennisetum purpureum	16(14.5)	39(35.5)	25(22.7)	18(16.4)	12(10.9)
Euphorbia heterophylla	20(18.2)	37(33.6)	33(30.0)	14(12.7)	6(5.5)
Commelina bengalensis	8(7.3)	34(30.9)	43(39.1)	20(18.2)	5(4.5)
Mitracarpus viridis	99(90.0)	5(4.5)	4(3.6)	2(1.8)	0(0)

Source: Field survey, 2019

*Multiple responses

Table 4: Methods of Weed Control

Control system	Percentage*
Manual	110(100)
Chemical	108(98.2)
Biological	4(3.6)
Integrated Weed Management (IWM)	3(2.7)

Source: Field survey, 2019

*Multiple responses