

An Assessment of the Impacts of Agro-Ecological Practices towards the Improvement of Crop Health and Yield Capacity: A Case of Mopani District, Limpopo, South Africa

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Abstract : The UNFCCC, FAO, GCF, IPCC and other global structures advocate for agro-ecology do address food security and sovereignty. However, most of the expected outcomes concerning agro-ecological were not empirically tested for universal application. Agro-ecology is theorised to increase crop health over agro-ecological farms and decrease over conventional farms. Increased crop health means increased carbon sequestration and thus less CO₂ in the atmosphere. This is in line with the view that global warming is anthropogenically enhanced through GHG emissions. Agro-ecology mainly affects crop health, soil carbon content and yield on the cultivated land. Economic sustainability is directly related to yield capacity, which is theorized to increase by 3-10% in a space of 3 - 10 years as a result of agro-ecological implementation. This study aimed to empirically assess the practicality and validity of these assumptions. The study utilized mainly GIS and RS techniques to assess the effectiveness of agro-ecology in crop health improvement from satellite images. The assessment involved a longitudinal study (2013 - 2015) assessing the changes that occur after a farm retrofits from conventional agriculture to agro-ecology. The assumptions guided the objectives of the study. For each objective, an agro-ecological farm was compared with a conventional farm in the same climatic conditional occupying the same general location. Crop health was assessed using satellite images analysed through ArcGIS and Erdas. This entailed the production of NDVI and Re-classified outputs of the farm area. The NDVI ranges of the entire period of study were thus compared in a stacked histogram for each farm to assess for trends. Yield capacity was calculated based on the production records acquired from the farmers and plotted in a stacked bar graph as percentages of a total for each farm. The results of the study showed decreasing crop health trends over 80% of the conventional farms and an increase over 80% of the organic farms. Yield capacity showed similar patterns to those of crop health. The study thus showed that agro-ecology is an effective strategy for crop-health improvement and yield increase.

Keywords : agro-ecosystem, conventional farm, dialectical, sustainability

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