# High-Yielding Oxylus Cabbage Variety Tolerant to Drought Stress and *Diamond Back Moth* for Ghana

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**Design target**
High-yielding oxylus cabbage variety tolerant to drought stress and diamond back moth

Emmanuel Ackah completed his 1st degree at the College of Agriculture Education, University of Education, Winneba in July, 2019. He pursued a Master of Philosophy degree in Seed Science and Technology at the West Africa Centre for Crop Improvement, College of Basic and Applied Sciences at the School of Graduate Studies of the University of Ghana from January 2022 to December 2023. Emmanuel does research in Agronomy and Agricultural Plant Sciences.

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**Product Profile design team**

**Step 1**

| | |
|---|---|
| **PP Design Team Lead/Champion** | Emmanuel Ackah |
| | University of Ghana, West Africa Centre for Crop Improvement (WACCI) |

| **PP Design Team** | | |
|---|---|---|
| **Person** | **Area of Expertise** | **Name of organization** |
| Emmanuel Ackah | Seed scientist | WACCI |
| Dr. Richard Kotei | Mechanization and Irrigation expert | Akenten Appiah-Menka University of Skills Training and Entrpreneurial Development |
| Dr. Eliezer Borketey-La | Entomologist | Akenten Appiah-Menka University of Skills Training and Entrpreneurial Development |

**Step 2**

| **Product profile descriptors** | |
|---|---|
| **Product profile name** | High-yielding oxylus cabbage variety tolerant to drought stress and diamond back moth |
| **Crop** | Cabbage (Brassica oleracea var capitata) |
| **Country** | Ghana |
| **Geographic regions** | Ashanti, Bono, Ahafo, Eastern, Greater Accra |
| **Market segment and positioning** | Fresh vegetable market |
| **Name of target variety to be replaced** | Oxylus<br>**Strength**:<br>Moderate head size and weight<br>**Weakness**:<br>Highly susceptible to water stress and diamond back moth |
| **Date PP created** | 01.03.20222 |

| **Target client and use** | |
|---|---|
| **Value chain primary clients/customers** | Farmers, retailers, agro-input dealers and consumers |
| **Market scale** | Household, supermarkets, open markets |
| **Use** | Food (stew, salad), animal feed, medicinal |
| **Type of processing** | None – fresh market |
| **Market class** | Medium to large |

| **Target crop producers and production system** | |
|---|---|
| **Number of farmers** | 900 – 1200 (about 35-40% grow oxylus variety) |
| **% ratio: male to female farmers** | 85-90% male: 10-15% female |
| **Production system** | Off season, controlled/open field irrigation |
| **Area of production system** | 1000 – 1800 ha |
| **Growth habit** | Determinate |
| **Expected level of inputs** | High use – fertilizer and protection, moderate-high irrigation depending on soil type, weed control |
| **Typical yield range of target system** | 50 tons/ha |
| **Cropping system** | Monocropping |
| **Mechanization** | Well adapted to mechanized land preparation |
| **Agroecological zone(s)** | Forest-savannah transition, forest, coastal savannah, semi deciduous climatic zones |
| **Total vegetative propagation material market** | 10-15kg |

**Step 3**

| Client/ customer | Driver | Trait category | Preference group: Women (W) Men (M) Youth (Y) W+M+Y (All) | Trait demand classification: *1. Essential/ "must have" 2. Niche opportunity 3. Added-value 4. Winning trait* | Target traits | Trait description (Quantitative measures) | Name of benchmark variety | Performance required compared to benchmark variety <, =, > etc. |
|---|---|---|---|---|---|---|---|---|
| Farmer | Productivity | Yield | All | 1 | Economic yield | Weight of marketable heads = 50 t/ha | Oxylus | ≥ |
| | | | All | 1 | Head weight | Average head weight ≥ 6 kg | Baraka F1 | ≥ |
| | | | All | 3 | Leaf area | Broadened leaves to increase light absorption | Oxylus | ≥ |
| | | Biotic stress resistance | All | 1 | Diamond back moth resistance | 1-9 scale: high (8) | Oxylus | > |
| | | Abiotic stress tolerance | All | 1 | Drought tolerance | 1-9 scale: high (8) | Oxylus | > |
| | Fodder/forage | Biomass | All | 2 | Number of leaves, leaf size | Greater number of leaves and broader leaves | Oxylus | > |
| | | Animal palatability | All | 3 | Sweet taste and palatable | 1-9 scale: moderate (6) | Oxylus | ≥ |
| | Crop management and harvesting | Plant architecture | All | 3 | Ovate | Ovate erect | Oxylus | = |
| | Market value and price | Head size/diameter | All | 1 | Head size of | Bigger head size (65 – 100 cm) for high biomass accumulation | Baraka F1 | ≥ |
| | | Crop duration | All | 3 | Early maturing | Number of days from seed sowing to physiological maturity | Oxylus (< 90 days) | < |
| | Post-harvest storage | Storage-life | All | 1 | Fresh heads after harvest | Fresh heads at room temperature for more than 14 days | Oxylus | > |
| Tansporter | Durability and cost | Container suitability | All | 3 | Durable/strong heads | Must maintain freshness in package material | Oxylus, Baraka F1 | ≥ |
| | | Transportability and storage | All | 3 | Durable/strong heads | transportation stresses | Oxylus, Baraka F1 | ≥ |
| Consumer | Satisfaction | Taste | All | 1 | Good taste and palatable | Sweet taste | Oxylus | ≥ |
| | | Appearance | All | 3 | Densely packed heads with green outer leaves | white inner leaves when cut | Oxylus | = |
| | | Shelf-life | All | 1 | Long shelf life | Fresh heads at room temperature for more than 14 days | Oxylus | > |
| | | Nutrition | All | 3 | High levels of minerals and fibre in leaves | Unspecified | Oxylus | = |
| | | Digestibility | All | 1 | Low or no gas production | Amount of CO2, hydrogen, methan and nitrogen produced | Oxylus | < |
| | | Food preparation | All | 3 | Fast cooking time, can be taken fresh in salad | Can be taken fresh in Salad | Oxylus | = |

*‘‘Cabbage has been classified as moderately susceptible to water stress, with the head formation stage being more sensitive. Other major production constraints identify through market research mostly reported in Ghana are insect pests, diseases, the need for high fertilizer input and the high cost of pesticides”*