14 - Avena Fatua (Common Wild Oat).

Date

Wasn't provided.

Common names

Common wild oat, wild oat

Family

Poaceae (Gramineae)

Origin

Native to the Mediterranean. Ethiopia, N. Africa, Europe and Asia among other locations

Introduced in East Africa

Avena fatua is found in the highlands of the three East African countries (Terry and Michieka, 1987) and in Kenya has been recorded in wheat growing areas in Rift Valley and Central provinces.

Habitat

Avena fatua is a roadside **weed** or **weed** of arable land among grain crops at altitudes of between 2100-2730 m.

Description

Avena fatua is an **erect**, tufted or **ascending** stout **annual** **grass** 30-150 cm tall that is a typical oat in appearance, a green **grass** with hollow, **erect** stems to 150 cm. It is sparsely hairy.

Leaf **blades** are flat, about 10-45 cm long and 3-15 mm wide with the **membranous** small structure at the junction of the leaf **sheath** and leaf **blade** (**ligules**) up to 6 mm long. The long dark green leaves are rough due to small hairs. The youngest leaf is rolled up.

The **ligule** is often irregularly toothed (**dentate**, fringed). The leaf bases do not have ear-like projections (auricles). Leaf **sheaths** are smooth or slightly hairy, especially in younger plants.

The **inflorescence** of *Avena fatua* is a loose, open **panicle** with 2-3-flowered stalked (pedicelled) **spikelet's**. The **panicle** is 10-40 cm long and up to 20 cm wide with spreading branches and the **spikelet's** hanging from long stalks (**pedicels**). Each of the 2-3 **florets** has an oval abscission scar at its base, causing them to fall separately.

Spikelet's are 18-28 mm long, with the narrow lance-shaped (**lanceolate**) **glumes** enclosing the 2-3 **florets** each of these with an articulation below **glumes**.

Lemmas are hairy, 14-20 mm long. **Seed** has an **awn** 2.5-4 cm long. Grains are 6-8 mm long. Seeds of *A. fatua* are viable for 3-8 years.

Reproduction and dispersal

Avena fatua is spread as a contaminant of cereal **seed**, by people, by farm animals and through contaminated shared farm implements. The seedlings are also hairy. The **awn** of the *A. fatua* **seed** twists into a helix on drying and untwists when wet, thereby drilling the **seed** into the soil.

Economic and other uses

Avena fatua is palatable and has **medicinal uses** but its benefits are outweighed by its **negative impacts**.

Environmental and other impacts

Avena fatua is considered to be one of the world's worst agricultural weeds and it is increasing in importance (CABI Crop Compendium 2011). It is an especially serious **weed** in grain crops such as barley and wheat. *A fatua* invades and lowers the quality of a field crop, typically wheat or oat fields and competes for resources with the crops. It causes soil dryness and provides favorable conditions for diseases and pests (e.g. frit fly, nematodes and smut).

Management

When it is a **weed** of cereal crops such as wheat, oats, barley it is difficult to distinguish *A. fatua* from the crop until flowering. Therefore, the wild oat should only be removed after flowering. Because *A. fatua* seeds can stay dormant in the soil up to 10 years, it is important to remove plants before they produce **seed**. *A. fatua* seeds should be removed before milling to ensure good grain quality. A controlled burn after harvest can reduce the viability of the *A. fatua* seeds that remain on the soil surface. Many selective herbicides can be effective alone, in mixtures or sequences. Correct timing and rate of herbicide application is critical to maximize control. When using any herbicide always read the label first and follow all instructions and safety requirements. If in doubt consult an expert.

References

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12 – Wild Oats.

Last Updated

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Statistics

Wild oats (*Avena fatua* and *A. ludoviciana*) represent a large cost to cropping. Wild oats are highly competitive and when left uncontrolled can reduce wheat yields by up to 80%. Greatest yield loss occurs when the wild oat plants emerge at the same time as the crop.

Distinguish Features

Wild oats have a large ligule with no auricles and the leaves tend to be hairy with a slight bluish hue. The emerging leaf is rolled. The seedling leaves are twisted anticlockwise, the opposite direction to wheat and barley. Wild oat seeds are usually dark but can vary through to cream. Hairiness of seeds also varies.
Wild oats tend to grow in discrete patches at low to moderate densities (up to 100 plants/m^2) and can be confused with brome grass in the seedling stage. All *Bromus* spp. have tubular leaf sheaths and hairy leaves and sheaths while wild oats exhibit a rolled sheath and few hairs on the leaves.

13 – Influence of soil moisture levels on the growth and reproductive behavior of *Avena fatua* and *Avena ludoviciana.*

Date of Publication

July 9, 2020.

Abstract (Experiment)

Wild oat (weedy *Avena* spp) is a problematic and cosmopolitan weed in >20 crops across 55 countries and can cause an enormous yield loss in winter crops [1, 2]. Two wild oat species [i.e., *Avena fatua* L. (wild oats) .The objectives of this study were to determine the growth and reproductive behavior of *A. fatua* at different soil moisture levels [20, 40, 60, 80, and 100% water holding capacity (WHC)]. Results revealed that *A. fatua* did not survive and failed to produce seeds at 20 and 40% WHC. However, *A. fatua* produced a higher number of seeds per plant at 80 (474 seeds plant^{-1}) and 100% WHC (480 seeds plant^{-1}). Seed production of *A. fatua* was 235 seeds plant^{-1}, respectively, at 60% WHC. The 60% WHC reduced seed production of *A. fatua* by 51 and 32% respectively, compared to 100% WHC. The plant height, leaf weight, stem weight, and root weight per plant of *A. fatua* at 60% WHC reduced by 45, 27, 32, and 59%, respectively, as compared with 100% WHC. Results indicate that the ability of *A. fatua* to produce seeds under water-stressed conditions (60% WHC) necessitates integrated weed management strategies that suppress these weeds whilst taking into account the efficient utilization of stored moisture for winter crops.

2 - Image Recognition Method Based on an Improved Convolutional Neural Network to Detect Impurities in Wheat.

Abstract

Impurities in wheat seriously affect wheat quality and food security. They are mainly produced during the operational process of combine harvesters. To solve the recognition and classification problems associated with impurities in wheat, a recognition method using an improved convolutional neural network is proposed in this article. A labeled dataset of normal wheat and five impurities is constructed, using which the Wiener filtering algorithm and the multi-scale Retinex enhancement algorithm are employed for image preprocessing. Based on network research using Inception_v3, improvement and optimization are undertaken before designing the WheNet convolutional neural network, which is intended for automatic recognition of wheat images. Under the same conditions, comparative experiments using the WheNet, ResNet_101 and Inception_v3 networks are conducted. Indexes such as receiver operating characteristic, area under curve (AUC), and recall rate are adopted to evaluate the experimental outcomes. Experimental results indicate that the WheNet network achieved the most efficient results. It also shows a shorter training time, and its recognition accuracies for Top_1 and Top_5 of the test set are 98.59% and 99.98%, respectively. The mean values of both the AUC and recall rate of the network on the recognition of various images of impurities are higher than those of the ResNet_101 and Inception_v3 networks. Consequently, the WheNet network can be a useful tool in recognizing impurities in wheat. Furthermore, this method can be used to detect impurities in other fields.

Materials Used

A. IMAGE ACQUISITION AND ARRANGEMENT
B. IMAGE PREPROCESSING
    1. ELIMINATION OF MOTION BLUR
    2. IMAGE BINARIZATION
C. LABELING OF THE IMAGE DATASET

Algorithm Used

WheNet CNN

TABLE 5. Performance comparison of the three CNNs

Network	Input image size	Training time (h)	Top_1 (Accuracy rate; %)	Top_5 (Accuracy rate; %)	Recognition efficiency (s/image)
ResNet_101	224 × 224	14	94.76	96.75	0.2
Inception_v3	299 × 299	15	95.84	97.70	0.3
WheNet	64 × 64	11	98.59	99.98	0.1