Eliminating Blight and Pests from the Valuable Potato Crop

Potatoes: Leading the World

Potatoes are the fourth-most important staple food in the world, with China filling the role of largest producer in the world. Grown in the northwest and northeast reaches of the country, the mountainous southwest hosts the largest sowing area of the tuber, accounting for one-third of China's total production volume.

Potatoes

Potato Blight: A Historic Pestilence

As one of the most commonly grown crops in the world, potatoes suffer widespread, potentially devastating diseases. *Phytophthora infestans* is a microbial organism that causes the notorious potato blight, which caused historic famine across Europe, particularly Ireland and Scotland, in the 1840s-50s. In Ireland alone, the blight claimed 10 million lives, while forcing over 2 million to flee the country.

Today, blight can occur throughout China. It begins to manifest as moist green-brown spots, surrounded by a yellow halo on the tips and edges of leaves. In humid climates, these lesions grow dark brown, surrounded by white mildew. In dry climates, lesions are limited.

Potato blight

The Ladybug: A Frequent Guest

Potato ladybugs mainly feed on potato, tomato, and eggplant. Adults are oval-shaped and approximately 6 mm long. The light brown pests have 14 similar black spots on each elytra, or wing shield. Adult and larvae feed on leaves and tender stems, leaving many ragged holes that cause brown spots and withering.

Potato Ladybug

The Diamondback Moth: Appetite for Destruction

The diamondback moth (*Plutella xylostella*) is harmful to a variety of vegetables, including potatoes. Early larvae are dark brown, gathering at the back of the leaves to eat its mesophyll. As it matures into a green adult, diamondback moths, they disperse and eat many small holes in the leaves, causing irreparable damage to the plant.

Plutella Xylostella

Effective UAV Operation

In early June, Shandong Zhucheng Yinong Electronic Business Agricultural Service Company conducted UAV operations to treat potato disease and pest prevention for 13-acre potato fields of Xianggu Farm in Zhucheng, Shandong Province. The company runs its own 67-acre farm, where they develop and refine their best drone spraying practices. At present, the UAV operation team has seven staff members, all of whom experienced pilots familiar with the growing, management, and pest control of various crops. In 2016, the UAV operation team purchased two DJI MG-1S, which have served a total area of over 2667 acres. In 2017, they acquired two additional MG-1S, serving over 533 acres in one month.

Operation Details

Flight Mode: F Mode
Operation Mode: Intelligent Operation
Operation Altitude: 2m
Flying Speed: 4m/s
Route Spacing: 5m
Dosage: 6 L/ac

DJI MG-1S flies over a potato field

Before the agricultural drones were used, farms employed typical methods of crop spraying, such as backpack or small boom sprayers, which held a limited pesticide volume and operation efficiency. These methods also added wear to tractors, accruing collateral losses in the long run. On the other hand, an agricultural drone covers approximately 13 acres in just three hours. Since potato-growing regions are in plain areas with orderly arranged fields, Smart Operation mode was selected for the UAV operations.

Intelligent Operation Mode

Dosage Details

Pesticide Name:

Yin-Fa-Li

Fen-Fen-Luo-Di

Pesticide Type:

Yin-Fa-Li: Suspending Agent

Fen-Fen-Luo-Di: Missible oil

Active Ingredient:

Yin-Fa-Li: Fluopicolide 62.5 g/L

Propamocarb hydrochloride 625 g/L

Fen-Fen-Luo-Di:

Matrine 0.4%

Azadirachtin 0.6%

Dosage:

Yin-Fa-Li: 450 ml/ac

Fen-Fen-Luo-Di: 270 ml/ac

The UAV Plant Protection team used the Bayer-produced Yin-Fa-Li to control the potato blight. To control and prevent ladybug and diamondback moth, as well as thrips from the surrounding wheat, the team used Fen-Fen-Luo-Di, developed by Yunnan Guangming Yinlian Industrial Company.

Yin-Fa-Li is a new, highly conductive pesticide mix, composed of protective fungicide fluopicolide and propamocarb hydrochloride, resulting in significant synergism. Fluopicolide belongs to benzamide fungicide and features excellent conductivity and a strong system of thin penetration. It shows significant effects in controlling common oomycetes diseases, such as downy mildew, blight, late blight and damping off. Propamocarb hydrochloride features high uptake conductivity and can rapidly spread evenly on leaves after spraying with excellent control efficiency against various oomycete diseases, including as downy mildew and late blight.

Pesticide: Yin-Fa-Li

The active ingredients of Fen-Fen-Luo-Di are the botanical pesticides matrine and azadirachtin. The plant alkaloid Matrine is a broad-spectrum pesticide, which is effective in controlling various pests such as armyworm, diamondback moth, tea geometrid, aphid, thrips, plant hoppers, and red spiders. Azadirachtin is an extract of azadirachtin from neem seeds. It is universally acknowledged as a kind of pesticide with broad spectrum, high efficiency, low toxicity, easy

degradation, and no residue. With no risks of pesticide resistance, azadirachtin is effective in controlling most plant pests.

Fen-Fen-Luo-Di

UAV Operation Tip: Repeated use of the same class of pesticides can cause resistance. Hence, we recommend rotating between different classes chemical classes or mixing different pesticides during the UAV operations to reduce pesticide resistance and strengthen pest control effects.