

New Approach for Columbian Root-knot and Root lesion Nematodes Management Using Movento

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The most important nematodes limiting potato production in Idaho are root-knot (*Meloidogyne* spp), stubby root (*Trichodorus* and *Paratrichodorus* spp.), and root lesion (*Pratylenchus* spp.) nematode. They reduce yield and quality causing economic loss to the grower. In some areas, stubby root nematodes also cause significant damage by transmitting a virus which causes corky ringspot disease, also known as tobacco rattles. Root-knot nematodes are of particular concern to the potato industry. Infestation can render tubers unmarketable when the level of infected tubers exceeds 5%.

Treatment with a fumigant, while effective, is becoming increasingly problematic due to added “set back” and other restrictions. Older, yet effective non-fumigant chemicals, like Temik, phased out because of safety or environmental concerns. The remaining non-fumigant nematicides such as Mocap or Vydate must be placed in the soil properly to achieve best control. In case of Mocap, the product should be applied and incorporated in the soil mechanically prior to planting. Vydate works best if applied via chemigation.

In the search for new crop protection products, Movento has been found promising for the management of nematode in potato cropping system. Movento is a two-way, systemic, foliar applied insecticide and nematicide. It is effective on a broad range of pests that infect above and below ground plant parts. Movento penetrates the leaf cuticle and moves from the treated leaves to all above ground plant parts and down to the root systems. This unique two-way systemic movement has provided excellent suppression of nematodes as well control or suppression of a broad range of insect pests.

In potatoes, Movento can control aphid, psyllid, whiteflies. It also provides suppression of mites, and thrips larvae in above ground plant parts. Below ground, it provides suppression of nematodes and wireworm. Movento can also suppress the diseases such as PVY, PLRV, zebra chip, verticillium and, corky ringspot by controlling their vectors.

Movento can be applied to potatoes at the rate of 5 fl. oz. per acre twice at an interval of 7 to 14 days. As Movento can only be absorbed when there is sufficient foliage, it cannot provide early season control of nematodes. Therefore, Movento should be included in a program with Vydate, Vapam or Mocap program. Grower should apply Movento early in the season when there is new growth of leaves with enough canopies. At this stage leaves are very receptive and Movento penetration and movement is efficient. The efficiency of Movento will be enhanced when penetrating surfactant such as MSO is tank mixed with it.

University of Idaho Research:

A) Optimum Timing of Movento for the management of Columbia root-knot nematode:

A study was done in Parma Research and Extension Center to optimize the best timing of Movento application for the management of Columbia root-knot nematode. The study showed that Movento applied early in the growing season at 14 and 28 or at 28 and 42 days after emergence resulted in less tuber infection compared to later applications at 42 and 56 or at 56 and 70 days after emergence. It is important to note that the 28 and 42 days after emergence is the approximately 58 to 72 days after planting (Figure 1). This application timing for the control of nematodes also closely matches with the application timing of Movento for the control of other pests such as psyllid (the vector of Zebra Chip) and wireworm.

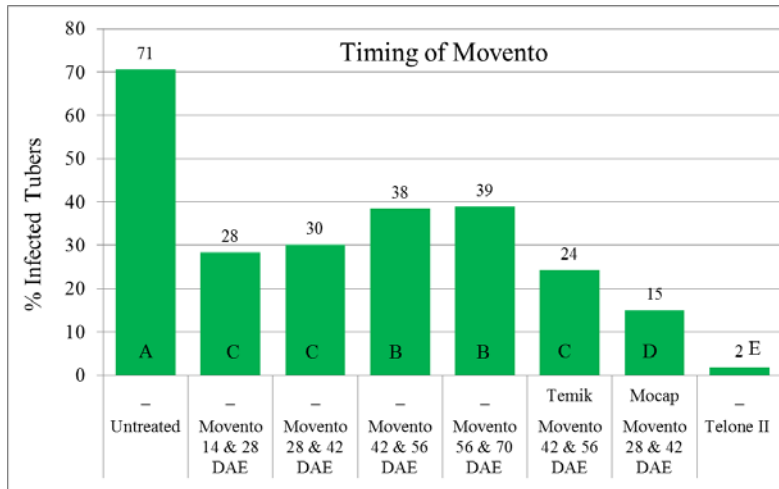


Figure 1: Effect of different timing of Movento application on the percentage of infected tubers. Data are mean value of five replications. Value followed by same alphabet is not significantly different according to Duncan multiple range test at $P \leq 0.05$. DAE= days after emergence.

B) Movento in Combination treatments for the management of Columbia root-knot nematode:

Movento can sufficiently reduce infected tubers but not at the level of reduction provided by fumigants such as Telone and Vapam. Fumigants can cover large volumes of soil and thus kill more nematodes. Movento is confined to root tissues and can control only those nematodes that feed on or close to roots of Movento treated plants. The studies done by incorporating Movento into the Vydate or Vapam programs has given outstanding results. Replacing two or three applications of Vydate with two applications of Movento have similar results comparable to the Vydate program with five applications. Similarly, Movento applied at 56 and 70 days after planting following Vapam in the fall gave best control of nematodes with lowest infected tubers, i.e., 2.5 % as compared to only Vapam application in the fall, i.e., 17.1% (Figure 2). In conclusion, fall application of Vapam followed by two applications of Movento at 56 and 70 days after planting appear to be a promising for the management of Columbia root-knot nematode in potatoes. Additionally, replacing later applications of Vydate with Movento allow potato growers the opportunity to benefit from Movento's activity on aphids, psyllids, whiteflies, mites, thrips larvae and wireworm while reducing nematode damage, while still utilizing the protection provided by Vydate at planting and prior to the development of enough potato foliage for a Movento application.

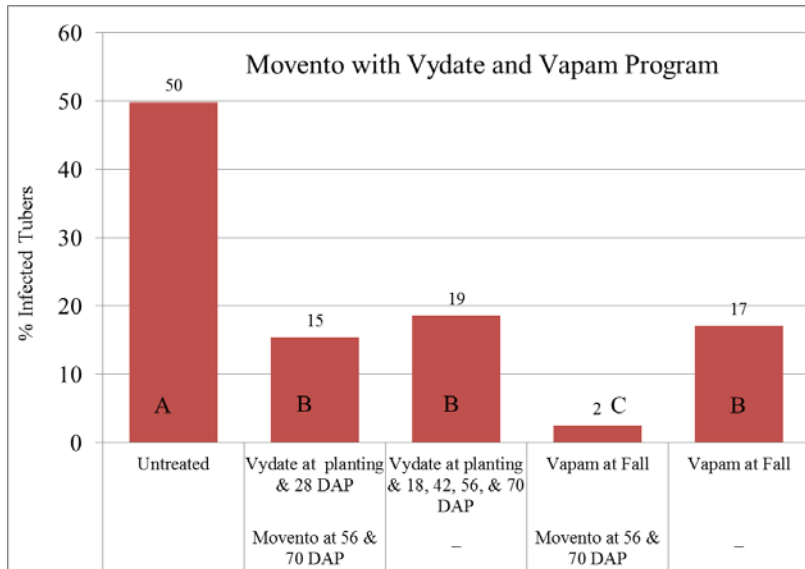


Figure 2: Effect of incorporation of Movento with Vydate or Vapam program on the percentage of infected tubers. Data are mean value of five replications. Value followed by same alphabet is not significantly different according to Duncan multiple range test at $P \leq 0.05$. DAP= days after planting.

Movento for the management of root lesion nematode:

Movento also controls root lesion nematode and increased total yield of potato. Movento applied at 60 and 70 days after planting following the applications of Admire Pro and Temik at planting increased tuber yield by 8% compared to the same treatment without Movento (Figure 3). While Temik is no longer registered or available for use on potatoes, the testing with and without Movento provide an indication of what Movento adds to the program.

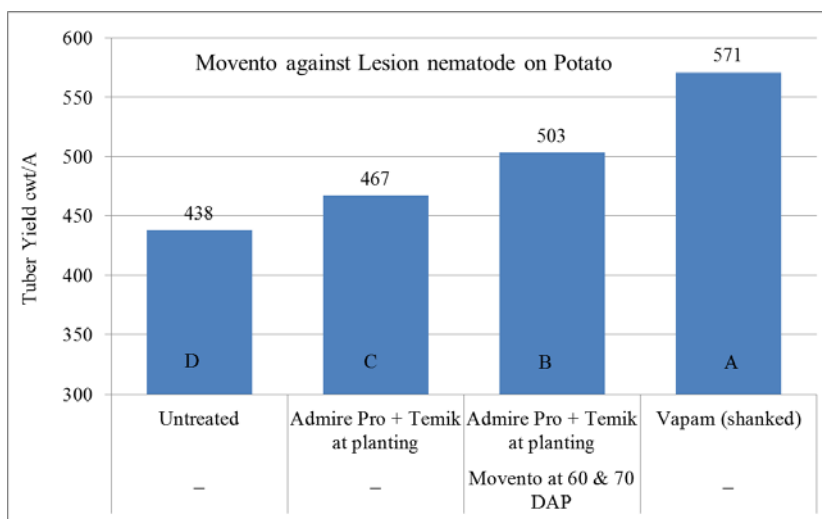


Figure 3: Effect of Movento on tuber yield. Data are mean value of five replications. Value followed by same alphabet is not significantly different according to Duncan multiple range test at $P \leq 0.05$. DAP= days after planting.



Figure 4: Symptoms of Columbia root-knot nematode (*Meloidogyne chitwoodi*) in potato tubers. Left: symptom inside the tuber, Middle: Symptoms on the tuber surface, Right: Healthy tuber with no symptoms.