

Development of Spraying Devices for Interplantation in Forest

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Abstract Honghuagang District, Zunyi City, Guizhou Province, develops the characteristic industry of crispy peaches, and at the same time develops the forest economy and promotes the model of planting soybeans in peach orchards to promote rural revitalization. However, due to the different pests and diseases occurring in peach trees and soybeans, the control drugs used are also different, and the existing technology for spraying and controlling peach or soybean seedlings is operated separately and cannot be sprayed together at the same time. This study, based on the actual situation of forest land, develops a spraying device for interplantation in forest (peach tree and soybean) from the aspects of technical solutions, working principles and beneficial effects, in order to solve the problem of low spraying efficiency of spraying control of peach tree or soybean seedlings in the existing technology.

Key words Relay cropping, Spraying devices, Woodlands

1 Introduction

Under-forest economy is an eco-agricultural model that makes full use of under-forest land resources and forest shade advantages to engage in under-forest planting, breeding and other three-dimensional composite production and management, so as to make agriculture, forestry and animal husbandry industries realize resource sharing, complement each other's strengths, cyclic symbiosis, and coordinated development^[1]. Through the study, it is found that the economic benefit of under-forest economy increases with the increase in the number of annual guidance of government technical services and the increase of operating area, and the products of under-forest economy not only have the tangible value of economic products, but also have the intangible value of ecological products, which have a duality and inseparable relationship between the two^[2-3]. Set seeding refers to the planting method of sowing or transplanting later season crops between the rows of plants at the late stage of the growth of the former season crops.

Industrial revitalization is the top priority of rural revitalization. The gradual promotion of under-forest economy, a new type of crop planting mode, especially the development of crispy peach specialty industry in Shamxi Town, Honghuagang District, Zunyi

City, Guizhou Province, as well as the development of under-forest economy and the promotion of soybean planting in peach orchards, has achieved better economic and social benefits. Soybean planting in peach orchards can effectively improve the field environment microclimate, which is conducive to the growth of peach trees and maximize the revitalization of land resources, on the other hand, the nitrogen fixation of symbiotic rhizobium in the roots of soybeans can also effectively improve the fertility of the land.

However, due to the different pests and diseases occurring in peach trees and soybeans, the control drugs used are also different, especially in the soybean seedling stage, soybean seedlings are weak in resistance to pests and diseases and drug resistance, so the cross-use of different control drugs will have an impact on the growth of peach trees or soybean seedlings, resulting in the existing technology of spraying control of peach trees or soybean seedlings is operated separately, and can not be sprayed together at the same time. This research develops a spraying device for peach tree and soybean planting to solve the problem that peach tree or soybean seedlings cannot be sprayed at the same time and the low spraying efficiency in the existing technology.

2 Technical program

The device includes a walking frame and a spraying mechanism, and the spraying mechanism includes a loading box, a spraying pump and a spray nozzle connected sequentially through a pipe, and a first spraying mechanism and a second spraying mechanism set at the top and the bottom of the walking frame, respectively. Among them, the traveling frame is provided with an isolation cover that surrounds the second spraying mechanism, and a receiving plate that is connected to the bottom of the isolation cover. There is a gap between the receiving plate and the bottom of the walking frame for soybean seedlings to pass through, while the receiving plate is provided with a first receiving slot and a second

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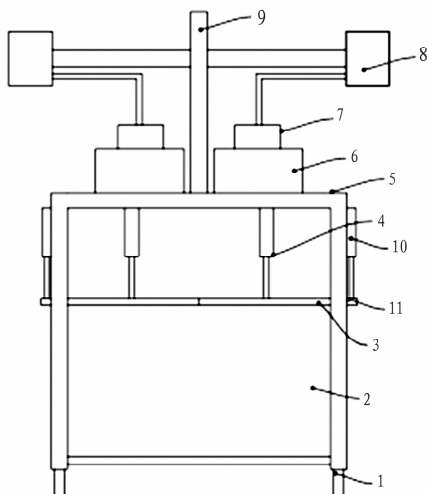
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receiving slot located at the outer and inner sides of the isolation cover respectively, including a scraping mechanism used in conjunction with the outer side of each side of the isolation cover, the said scraping mechanism comprising a first cylinder fixedly located with the walking frame and a second cylinder, and the movable ends of the said first cylinder and the second cylinder are fixedly provided with a first magnet plate and a second magnet plate in turn. The movable ends of the first cylinder and the second cylinder are fixedly provided with a first magnet plate and a second magnet plate, said first magnet plate and second magnet plate are all connected to the outer side of the isolation cover; said walking frame is also fixedly provided with a plurality of telescopic rods, and each telescopic rod is fixedly socketed with a third magnet plate which is used in conjunction with the corresponding first magnet plate or the corresponding second magnet plate, said third magnet plate and the inner side of the isolation cover are connected to one another by magnetic adsorption between the third magnet plate and the corresponding first magnet plate or corresponding second magnet plate. are magnetically adsorbed to each other.

3 Schematic diagrams related to the device

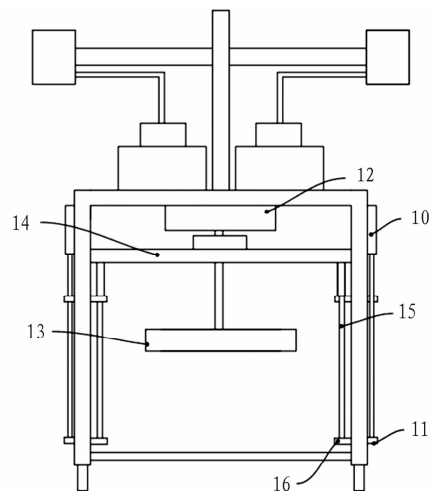
3.1 Main view The main view of the spraying device for understory set seeding is shown in Fig. 1, including: walking wheel, isolation cover, second magnet plate, second cylinder, walking frame, first loading box, first spray pump, first spray nozzle, support frame, and first cylinder.



NOTE 1. walking wheel; 2. isolation cover; 3. second magnet plate; 4. second cylinder; 5. walking frame; 6. first loading box; 7. first spray pump; 8. first spray nozzle; 9. support frame; 10. first cylinder.

Fig. 1 Main view

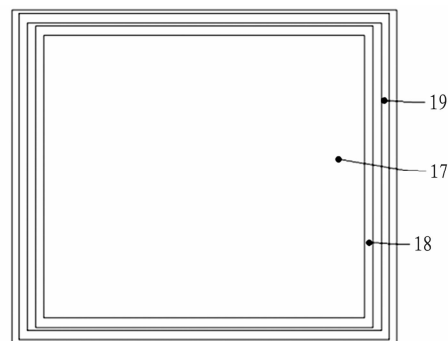
3.2 Structure inside the isolation cover The structure located inside the isolation cover is schematically shown in Fig. 2 and includes: a first magnet plate, a second loading box, a second nozzle, a connecting frame, a telescopic rod, and a third magnet plate.



NOTE 11. first magnet plate; 12. second loading box; 13. second nozzle; 14. connecting frame; 15. telescopic rod; 16. third magnet plate.

Fig. 2 Structure located inside the isolation cover

3.3 Top view of the medication receiving plate A top view of the receiving plate of the device is shown in Fig. 3 and includes: a receiving plate 17, a second receiving groove 18, and a first receiving groove 19.



NOTE 17. receiving plate; 18. second receiving groove; 19. first receiving groove.

Fig. 3 Top view of the receiving plate

4 Working principle and beneficial effect

This device in the walking frame at the top and bottom of the first spraying mechanism, respectively, the second spraying mechanism, the height of soybean seedlings is low, receiving plate and walking frame at the bottom of the gap between the soybean seedlings through the walking frame can be pushed to walk on the field, soybean seedlings through the gap to move to the bottom of the walking frame, spraying pump will be loaded in the drug tank pressurized liquid pumped out of the nozzle through the nozzle outward spray, so that the first spraying mechanism of the spray nozzle on the higher heights of the drug. The spray nozzle of the first spraying mechanism sprays the peach tree at a higher height, and the spray nozzle of the second spraying mechanism sprays the soybean seedlings at the bottom, and, because the isolation cover

covers the soybean seedlings above and around, the spray mist sprayed by the spray nozzle of the second spraying mechanism will not pass through the isolation cover and run out, and the spray mist sprayed by the spray nozzle of the first spraying mechanism will not pass through the isolation cover and fall onto the soybean seedlings, thus solving the problem of the cross use of the prevention and control drugs that may cause damage to the peach tree or the soybean seedlings, and the spray nozzle will not pass through the isolation cover and fall into the soybean seedlings. This solves the technical problem that the cross-use of control drugs will have an impact on the growth of peach trees or soybean seedlings.

In addition when the spraying operation is carried out for a period of time, the sprayed medicinal mist is heavily stained on the inner and outer sides of the isolation cover, and this medicinal mist can be collected and reused, which would otherwise result in a waste of medicinal liquid.

The device is provided with a scraping mechanism for use with each outer side of the isolation cover, the scraping mechanism includes a first cylinder and a second cylinder fixedly provided with the walking frame, the movable ends of the first cylinder and the second cylinder are respectively fixedly provided with a first magnet plate and a second magnet plate which are offset from the outer side of the isolation cover, and the walking frame is also fixedly provided with a telescopic rod, the telescopic rod is fixedly fitted with a third magnet plate which is used in conjunction with the corresponding first magnet plate or the second magnet plate, and the third magnet plate which is used in conjunction with the corresponding first magnet plate or the second magnet plate is fixedly fitted with a third magnet plate. The walking frame is also fixed with a telescopic rod, the telescopic rod is fixedly socketed with a third magnet plate that cooperates with the corresponding first magnet plate or the corresponding second magnet plate respectively, the third magnet plate and the inner side of the isolation cover resisting, and the third magnet plate and the corresponding first magnet plate or the corresponding second magnet plate adsorb each other by magnetic force.

Therefore, at this time, the first cylinder is activated to drive the first magnet plate to move downward, the first magnet plate drives the third magnet plate adsorbed with it to move downward, the telescopic rod is extended, and the first magnet plate and the third magnet plate scrape downward and collect the medicinal fog on the corresponding area of the isolation cover, and the walking frame is also fixedly equipped with a medication catching plate that resists the bottom of the isolation cover, and the medication catching plate is equipped with first medication catching grooves and second medication catching grooves that are located at the outer and inner sides of the isolation cover, at which time the first

medication catching plate is provided with a first medication catching slot. The receiving plate is provided with a first receiving slot and a second receiving slot located on the outer and inner sides of the isolation cover, at this time, the first magnet plate promotes the medicinal liquid attached to the outer side of the isolation cover to converge and flow to the first receiving slot, and the third magnet plate promotes the medicinal liquid on the inner side of the isolation cover to converge and flow to the second receiving slot, so as to realize the medicinal liquid repeated collection and utilization. Similarly, at this time, the first cylinder drives the first magnet plate to move upward, the first magnet plate drives the corresponding third magnet plate to return to the initial stage at the same time, the second cylinder drives the second magnet plate to move downward, the second magnet plate drives the third magnet plate which is adsorbed to each other through the magnetic force to move downward for the collection of the medicinal liquid, and repeats the above operation, and collects and scrapes off the medicinal liquid which is adhered to the outer side and the inner side of the isolation cover in the remaining part.

Moreover, since the device is provided with a first cylinder and a second cylinder to scrape off the medicinal mist in a sub-region of the isolation cover, the first cylinder and the second cylinder work alternately to scrape off the medicinal liquid, thus realizing non-stop spraying work, then when the first cylinder drives first magnet plate to move upward, the first magnet plate moves upward to scrape the newly adhered medicinal mist upward, and the second cylinder connected to the second iron plate is located on the upper part of the isolation cover, and the medicinal mist is then converged and moved downward along the outer side and inner side of the isolation cover, the remaining part of adhered medicinal liquid is collected and scraped off. Then converge and flow down the side of the isolation cover away from the first cylinder to the first receiving tank or the second receiving tank, so as to avoid the isolation cover of the whole region of a one-time scraping, the larger scraper blocking the drug mist flowing down the isolation cover, resulting in the problem of the liquid flowing outwardly to deviate from the receiving plate to fall to the ground.

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