



Concern Over Chinese UAV Plant Protection, Jointly Build Benign Eco-Market System


By Grace Yuan

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According to statistics, the possessing capacity of plant protection UAVs has reached 14,000 units in China, and their crop protection service exceeded 100 million mu (6.67 million Ha). China has about 134.8 million Ha of arable land. In 2018, the UAV crop protection area is expected to extend beyond 200 million mu (13.3 million Ha) to reach 300 million mu (20.0 million Ha) in China. Thus it can be seen that UAV crop protection is changing China's plant protection mode at an unprecedented pace, and changing the production mode of China's traditional agriculture. However, hidden behind the rapid development of plant protection UAVs are many problems, which are mainly reflected as: 1. Lack of superior and efficient UAV application-oriented formulations; 2. Lack of precision UAV pesticide spraying technologies; 3. Lack of consistent industrial standards and regulations to regulate the industrial behavior; 4. Lack of a sustainable operation model.

At present, pesticide production companies, such as Syngenta, Bayer, BASF, FMC, Wynca, and Guangxi Tianyuan, and adjuvant manufacturers such as Solvay, Grand AgroChem, and Guilin Jiqi, have devoted themselves to the development of formulations and/or adjuvants in China, especially for UAV plant protection, by exerting their respective advantages.

The effect of a good formulation can only be maximized with supportive application technology. "China currently lacks low-altitude and low-volume application technology by drones, and there is no corresponding professional spraying system either. The research, development and selection of suitable nozzles, the matching of nozzle and spray flow field, the design of the cartridge, the systematic research and development of dosing systems, and so on, are badly needed to optimize atomization and droplet deposition," said Professor He Xiongkui of the Spraying and Application Research Center of the China Agricultural University, in an interview with AgroPages. He also shared the latest progress of the ISO International Standard - Plant Protection Drones, which is being developed under the lead of China, is expected to be released in 2020.

Regarding the sustainable operation mode, a "4 in 1 community" development mode has been recommended in the industry, which is an integration of UAV operator, UAV, formulation and adjuvant products, and UAV plant protection technology. But there will always be various problems during its practical implementation.

In consideration of the above problems, AgroPages recently invited five companies of the four main bodies, including Solvay,

Syngenta, Wynca, DJI Agriculture and Guangxi Tianyuan, which are well-known and have the discourse power in the industry, to have in-depth discussions.

An overview of the development for UAV plant protection in China:

- In 2010, China's first plant protection drone was launched on the market.
- In 2013, Plant protection by drones was commercially promoted nationally.
- In 2014, the No. 1 Document of the Central Government clearly stated to "strengthen the construction of agricultural aviation".
- In 2014, the operation area of aviation plant protection reached 0.67 million Ha.
- In 2016, the former Ministry of Agriculture initiated the establishment of the "National Aviation Plant Protection Technology Innovation Alliance".
- In 2016, the operation area of aviation plant protection reached 2.0 million Ha
- In 2017, the possessing capacity of plant protection drones in China reached 14,000 units, and the operation area of aviation plant protection exceeded 6.67 million Ha.
- In 2018, the operation area of aviation plant protection is expected to exceed 13.34 million Ha.
- In 2020, an ISO International Standard - Plant Protection Drones, which is developed under the lead of China, is expected to be released.

Solvay: Drift control and deposition adjuvants for agricultural application

UAV crop protection is a growing trend worldwide, in particular China, with agricultural drones providing all-in-one solutions primarily for precision farming and spraying of crops. This trend impacts tank mix adjuvants which are a key additive to enhance efficiency of drone spray. Based on Solvay 25 years' experience in this field, we reflect on trends in this market as well as on the future of innovation in tank mix adjuvants, with a focus on drone spray in China.

What are tank mix adjuvants?

Tank Mix adjuvants are added directly to the farmer's tank together with the pesticide to improve the performance of the active ingredients, and mitigate negative effects such as drift and bouncing. Adjuvants are classified according to the benefit they bring: spray performance (water conditioning, drift control,...) or activator (retention, spreading,...). As spray drift and deposition are complex and depend on a large set of criteria (spray characteristics, equipment, weather,...), expertise in formulation as well as appropriate best in class technologies are needed.

The global tank mix adjuvant market is estimated at 1 Billion USD globally, with North America representing about 70% of this market. While surfactants (NIS) and oil-based adjuvants (Crop Oil Concentrates COC and Methylated Seed Oils MSO) make up 50% of the total market, Drift-Reduction Agents (DRA) have received tremendous attention from the market lately also due to evolving regulation globally. With innovation as a main driving force, Solvay is a leader and pioneer in the development of DRA products.

Solvay decades of drift control and deposition adjuvants

Solvay has been a leading formulator of tank mix adjuvants for agricultural applications for more than 25 years. Besides those large commodity categories of adjuvants, one particular category of tank mix adjuvants - Drift-Reduction Agents (DRA) - has received a lot of attention from the markets lately. DRA is a 150 Million USD market globally. As a leader and pioneer of DRA, Solvay first introduced guar-based dry adjuvants in the US market in 1996 after years of collaboration with Princeton University. A decade later, water-based liquid guar DRA was developed as the first multi-functional products (DRA + NIS + activator).

Innovation has always been the main driving force behind

Solvay portfolio of DRA tank mix products, and the pace of new product introduction has increased in the past few years. On the guar technology frontline, Solvay's Starguar® latest generation of oil-based multifunctional adjuvants offer the multifunctionality of drift control, NIS and MSO.

Launched in 2015 Starguar® Control was the first DRA prescribed for new dicamba formulations and approved by the U.S. EPA as a mandatory DRA to mitigate the risk of off-target movement control for in-crop use on soybean. It was successfully commercialized and it is now the reference of drift control in US agriculture (used on 30 million hectare of row crops in 2017). Future developments for systems combining dicamba and glufosinate are currently under development in Solvay Agricultural Applications Labs in the US, Brazil, France and China. The internationalization of its portfolio of tank mix adjuvants is a top priority for Solvay, as regulation agencies, agrochemical formulators and agronomists across the world are starting to embrace the benefits of drift control, retention and penetration of the pesticide spray tank.

In Europe, regulation aimed at reducing the amount of pesticide spray while maintaining the same control performance for farmers put DRA adjuvants at the center of the approval agenda for new chemistries of active ingredient.

In Brazil and Australia, the new dicamba based herbicide systems launched in the US for cotton and soybean will reach the market with a similar emphasis on controlling drift and off-target movement control. Fungicide resistance is a key battle in Brazil to fight off Asian soybean rust, and the use of retention aids and rain fastness adjuvants can boost and extend the performance of fungicide chemistries (carboxamides, strobilurins and azoles), as demonstrated in field plots using Starguar® technology.

In Southeast Asia and China, the rise of contact herbicide glufosinate as an alternative to paraquat creates new demands to control drift as well.

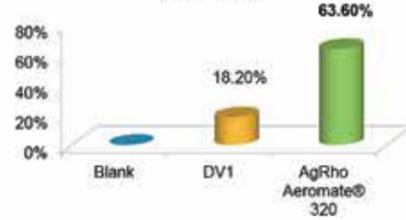
Finally, one of the most promising and exciting new field for tank mix adjuvants is Agricultural Spray Drones in China, a leading country for the adoption and digitalization of spray drone applications.


Antoine Viellard

 Global Marketing Director
 at Solvay Novocare Agro

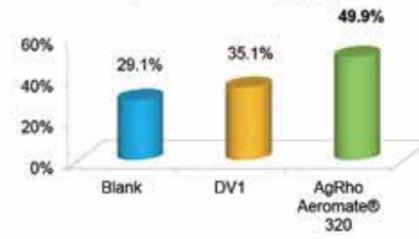
桶混助剂 AgRho® Aeromate 320 Tank Mix Adjuvant

Evaporation Inhibition 抗蒸发率 温度: 33°C



AgRho® Aeromate 桶混技术是为航空植保专门定制开发的, 有效增加雾滴粒径 (减少飘移) 和提高沉积率 (增加药效) This Tank-Mix Platform is specifically designed for aerial applications. AgRHO Aero-mate technologies help to increase droplet size (drift reduction) and improve deposition rate (improved efficacy)

Deposition Rate 沉积率



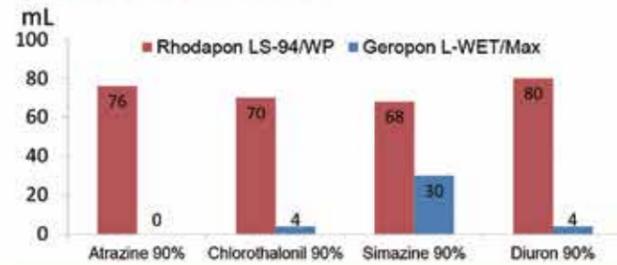
净泡润湿剂 Geroon L-WET/MAX Low Foam Wetting Agent



更快, 更干净 Quicker Defoaming Less Foam Residue

Atrazine WDG 90% 持久起泡性 Persistent foaming 30°C (1g→200 mL Water D), 30°C

- 残留泡沫更少 Lower persistent foaming
- 高润湿加速崩解 Quicker disintegration
- 高悬浮率 High suspensibility



农化创新解决方案 Agro Innovative Solutions

Agricultural drones in China and Solvay solutions

Agricultural drones are mainly used for precision farming, but they can perform various farming operations such as crop protection spraying. The Agricultural Drones Market is expected to reach USD 3.7 billion globally by 2024. Today, this practice is already very well adopted in countries with very small land plots as it represents an easy and cost effective solution for farmers. In Japan, already 60% of paddy rice use drones. In China, less than 2% of the 140 million Ha of China's arable land is using Agricultural Drone. With a very fragmented farm structure, this practice is expected to grow very quickly and this represents a very large opportunity in the agricultural sector.

For small crops in China, Ultra Low Volume spray (about 10L/ha) is required, from 2 meters height, at a speed of about 50Km/h. In such conditions, a major challenge of adjuvants is to control drift and evaporation, and enhance deposition and coverage to improve biological efficacy.

Solvay has started the screening and development of tailor made tank mix adjuvants for drones in collaboration with the Chinese Academy and Institute. Several trials were conducted on paddy fields with already promising results with our AgRho® Aeromate Series specifically designed for the Chinese spray drone application market. While AgRho® Aeromate 320 was launched in 2018 in China to offer accurate targeting and helps boost efficacy by combining anti-drift, anti-evaporation and anti-rebound properties to act directly where it is needed (As shown in Figure 1 and Figure 2).

In addition, Solvay launched a new digital channel for the China market. AgRho Aeromate 320 is now available online, on Solvay Flagship Store on 1688.com, Alibaba's B2B Ecommerce platform in China to involve farmers' associations, formulators, large farmers, etc. to develop this market together. As part of this online sales initiative, Solvay has broadcasted a live show on 1688.com to demonstrate how to use tank mix adjuvant for drone spray. The Live Show on Alibaba provides a great opportunity to raise awareness of drone spray application to show the expertise and ability for today's challenges in agriculture.

Solvay continues to innovate and will launch a new product, AgRho Aeromate 380 in 2019 with multi optimized performance for drone application to improve biological efficacy.

To conclude, tank mix adjuvants will continue to grow as an ever sophisticated tool for the future of Farming, enabling farmers to safely spray multiple herbicide combos in the US, Brazil and Australia, allowing Europeans farmers to continue to reduce input doses while optimizing efficacy of active ingredients and minimizing off-target movement, and preparing the digital farming revolution in China with application-specific products for spray drones. Solvay is proud to have started this journey 25 years ago and is looking forward to continue to be at the forefront of innovation for tank mix adjuvants (As shown in Figure 3).

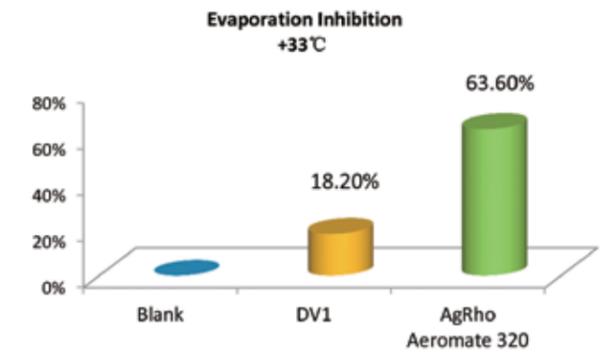


Figure 1. AgRho Aeromate 320 helps anti-evaporation at rather higher temperature

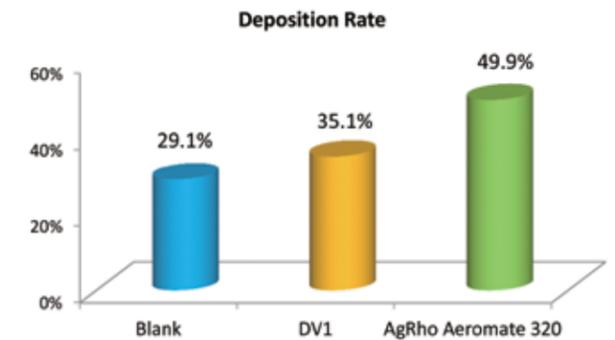


Figure 2. Strong enhanced deposition rate that translates into higher efficacy, Paddy rice drone spray field test in Jilin, 2017

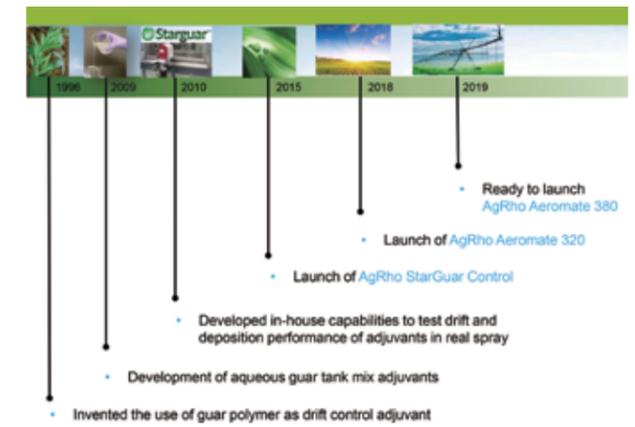


Figure 3. Solvay Tank Mix Adjuvant Journey



Syngenta: Continues to unlock capabilities of UAV systems and refine formulation technology

Pesticide application technologies are advancing rapidly, and our goal at Syngenta is to ensure that these technologies not only increase efficiency, reduce cost, and ensure better human and environmental safety, but also continue to improve the dose transfer process for crop protection products that add value to the bottom line of growers and applicators by being more effective and efficient than ever before.

Unmanned aerial vehicle (UAV) applications are becoming increasingly common in Asian countries, reducing the drudgery of manual pesticide application, improving efficiency, and reducing labor costs. All of these reasons are important for growers to take a great interest in this technology. It is just as important, however, to consider the quality of the application when determining the best method for your crop needs. We define a "quality application" as delivering the right product, at the right rate, and at the right target location to treat the target pest under a certain set of conditions. Without a quality application, all other advantages that the UAV technology may afford will be diminished. Planning and executing a quality application require more than just a simple scan of label instructions, and a broader understanding of the product, equipment and environmental factors.

So what should be considered to ensure a quality application? Reducing off-target application, achieving the necessary coverage, penetration and retention on the target surfaces and reducing run-offs are all critical requirements. In order to achieve these criteria, more decisions about the application must be made. Correct nozzle selection, pressure, flow-rate, height above canopy, speed and ensuring the environmental conditions are conducive to your application are key factors that contribute to the quality application. All of these parameters will likely need to change depending on the crop, target pest and environmental conditions. Unless these parameters are known and set correctly, there is a high risk of a poor application that could result in crop damage, exposure, and reduced efficacy.

A quality application takes the safety of humans, livestock, beneficial insects and other elements in a sustainable environment

into consideration. Syngenta scientists are working closely with the stewardship, cross-industry groups and Chinese government bodies to deliver safe operating instructions, provide safety data and develop a regulatory framework specific to UAV applications.

The success of a quality application is also closely linked to the features of the formulation. Formulated products should be designed with a number of criteria in mind, including the aims of a quality application. When considering UAV applications, the ultra-low carrier volumes, the most concentrated tank-mixes and little or no agitation, crop protection formulators will need to specifically meet the delivery expectations of this technology with increasing regularity as the UAV applications grow. As we continue to unlock the capabilities of UAV systems, Syngenta will continue to refine formulation technology that will provide growers with the efficacy they expect and trust from us.

At Syngenta, we are investing time and resources across multiple regions to better understand this new delivery technology and the capabilities it offers, while ensuring the efficiency, effectiveness, and the ultimate safety of the operators, crops, and the environment. Ensuring that we can achieve an acceptable level of efficacy through a quality application is the number one objective across all of our development testing. Our full understanding will allow us to inform the adopters and give them the tools and knowledge they need to make decisions with high confidence for ensuring high quality of applications. Through education and awareness, we can reduce the risks and ensure that Syngenta's products will perform the way that they were designed.



Neill Newton M.S.

Sr. Product Application Specialist, Product Technology and Engineering at Syngenta



Wynca: Strengthens development of formulations and adjuvants for UAV application, Nongfeike Platform plays an active role in establishing benign eco-market

Q1. How would you comment on the existing problems of UAV plant protection products, at present, and what is the major technical barrier to solving these problems? Are there any potential solutions? What is the future trend of development for UAV plant protection products?

The main existing problems at present: There is a serious lack of formulation products on the market, therefore what is actually done is just to use a certain amount of spraying adjuvants together with normal pesticide formulations, to try to ensure the effect of aerial applications. Formulations which are being used are mostly of small particle sizes, such as the formulations of SC, EC, EW, ME and WDG. It is not desirable to use normal pesticide formulations directly for aerial application, as normal pesticides are designed for use in large water amount spraying equipment, to meet the requirement of dispersibility, wettability and suspensibility. For conventional pesticide applications, each Mu (0.067 Ha) of land would need 18-36 kilos of water for dilution at 3000-5000 folds. As regards aerial applications, each Mu (0.067 Ha) of land needs only 500-1000 ml. of water for dilution, at only 30-50 folds. Besides, different vendors are using different solvents for pesticides with the same content, which may cause pesticide agglomeration and layering, as well as nozzle jamming at the time of aerial applications. In more serious cases, repeated spraying and missing spraying can happen, which not only reduces the effectiveness of pest control, but also causes pollution, resulting from unused pesticides. This is not compliant with the requirement of the objective of "reduction of the use of pesticide and fertilizer."

Major technical barriers: How to maintain a high degree of dispersity of pesticides under low dilution conditions? Bearing in mind that the research of low altitude aerial application technology in China is relatively weak.

Possible solutions: To screen out appropriate active ingredients and pesticide adjuvants to develop high-content and high-soluble formulations for use in aerial applications, which should be subjected to very precise and extensive trials, just like normal pesticides, thus helping aerial applications to develop properly and soundly.

Future trends: Concerning future pesticide development in support of UAV applications, there is a need for development of pesticides of higher efficiency and higher safety, meanwhile being appropriate for low volume spraying operations.

Pesticides for aerial applications should be easy to use without

the need for dilution, and should be compatible for simplified mixing, to be packed in larger packages and liquid solutions or to be granulated. Pesticides used for future aerial applications will be oriented to multiple-function formulations or formulation combinations, which will have the features of fast precipitation and wetting, resistance to drifting and evaporation, as well as a broad spectrum.



Qin Long

The Director of Technology Center at Wynca

Q2. Can you give a briefing of the advantages of the UAV application-oriented adjuvants and formulations produced by Wynca? How are the promotions and applications going on?

In 2017, Wynca conducted restructuring of its research institution, taking into account the agricultural service strategy of the company, thus to move towards integration of production and technical research. The research team, which is dedicated to aerial application-oriented pesticide and adjuvant development, has 26 staff members, including 1 doctorate and 25 post-graduate staff members. Wynca is also cooperating with the Chinese Academy of Agricultural Sciences, Zhejiang University of Technology, Nankai University and Nanjing Agricultural University, in research and development of aerial application-oriented pesticides and adjuvants. In the meantime, the research hardware facilities of Wynca are much improved, as all fundamental pesticide adjuvant analysis methods and equipment are made available. Wynca has its complete analytical appliances for analysis of contact angles, droplet sizes and droplet depositions, being able to conduct all necessary tests. We are now considering the setting up of our product evaluation system.

So far, Wynca has introduced several aerial application-use adjuvants, and is conducting nation-wide testing and trial applications via the Nongfeike Platform. At present, our third-generation aerial application-use adjuvant, Revoiate, has received positive feedback from the market. Compared to other products, this one not only ensures evenly atomizing, wetting and spreading of pesticides, but also performs very well in its resistance to drifting and volatilization, which are crucial factors for successful aerial application operations.



To cope with the issues of agglomeration and precipitation existing on aerial applications, we are right now conducting research into the whole pesticide system, and will gradually release solubilized adjuvants for aerial applications. Wynca is also working actively on research and development of pesticide formulations for aerial applications, focusing on applications to crops, such as paddy rice, sugarcane and tea tree.

Q3. What is the challenge to Wynca in respect to the development and promotion of the UAV application-oriented products? How does your company tackle the challenges and what is your future plans?

In 2018, the focus of aerial applications in China changed from the attention to the performance of agricultural drones to concerns over the effect of crop protection, which shows that the market is becoming more practical and rational. Wynca started business deployment in aerial crop protection in 2015, as supported by Nongfeike service outlets all throughout China, which could enable the collection of data on aerial applications to various crops. Using its crop research institute as a strong backup, Wynca lays stress on development of products adapted to aerial applications. After years of hard work, Wynca has developed a number of products adaptable to aerial applications, such as the aerial application-use adjuvant "Revoiate", which has received positive feedback from the market. However, the process of registration of several products for aerial applications is proceeding quite slowly, mainly due to ICAMA's lack of explicit registration procedures and industry standards governing aerial application-use pesticides. The requirement of pesticides for aerial applications is quite vague. This causes difficulties for the development of products for enterprises, yet it is believed that agricultural administration authorities will be able to provide clear instructions as aerial applications are further developed.

So far as pesticides for aerial applications are concerned, Wynca's solution is, on the one hand, to fully utilize its advantage of research capacity to add tank-mixed adjuvant to adapt to aerial applications, so as to solve the problem of agglomeration of normal pesticides. On the other hand, Wynca is conducting indoor testing of a large number of tank-mixed pesticides in order to work out a regular pesticide combination for aerial applications covering a variety of crops, thus to ensure the effect of aerial applications. For the development of aerial crop protection in the future, it is essential to have more adaptable products. Therefore, Wynca is prepared to carry out research on pesticide and adjuvant mixing, formula development and rationality of content, to produce and ensure the registrations of green pesticides, which are adapted to aerial application. Only by this approach, can we adapt ourselves to the needs of aerial application.

Q4. What do you think of the "4 in 1 community" formation in the UAV crop protection industry of China? What kind of mode of cooperation would be able to better promote an optimized development aerial application?

The "4 in 1 community" formation in UAV crop protection represents integrated operations of the UAV operator, UAV, UAV crop protection technology and UAV application formulations and adjuvants.

It is now well acknowledged within the industry that the "4 in 1 community" formation is the only way that leads to successful development of aerial crop protection. Agricultural drone vendors have the distinctive advantages of the UAV operator and drone, while conventional pesticide enterprises are qualified for the research of pesticides and adjuvants for aerial application, based on their experiences. On the other side, Chinese universities and research institutes have the advantage of governmental subsidies, which provides them with unique support in the exploration of aerial crop protection technologies.

We all know that aerial applications will work well only if the UAV operator, UAV, UAV crop protection technology and aerial application formulation and adjuvant are integrated. However, in real world applications we will come across many challenges, which I would summarize as the following 2 points:

1) The 4 elements in the "4 in 1 community" still to be improved.

At the present time, no matter whether it is a drone vendor or a formulations enterprise, due to restrictions of their financing, sales networks and strategies, they are mostly conducting product development and market promotions from their own perspectives, and, thus, most of the enterprises still follow the route of "promotion of product to market". Today, aerial crop protection needs products which can stand up to the market and stand the test of time. Moreover, there is presently more theoretical research being performed on aerial crop protection technology, than on practical applications.

2) Lack of strong and supportive platform for integration of resources

Both the drone vendor or formulations enterprise will not be able to do well on its own without the integration of UAV operator, UAV, UAV crop protection technology and aerial application formulation and adjuvant. This requires a strong and supportive platform, which is backed up by abundant capital and strong resource integration capacities. The platform needs to make every effort to consolidate resources of all players, and should not be limited to specific product brands. As such, the 4 elements in the "4 in 1 community" can be properly integrated.

From the experiences of Nongfeike Platform in recent years, the purely crop protection business mode will eventually be

eliminated. Crop protection cannot go far if it is not integrated with agrotechnical services; it will not be sustainable if there is not an integrated aerial crop protection service package. To this end, Nongfeike has been trying to build such a platform over the past years, so as to consolidate upstream and downstream resources.

DJI: Forges premium crop protection UAVs and creates benign eco-market with partners

Q1. Could you give a briefing of your achievements in UAV crop protection applications? With what companies DJI Agriculture has established strategic partnership and how is the cooperation going on now?

Up until July 2018, the domestic possessing capacity of DJI's MG series reached over 16,000 units in total in China. According to third-party statistics, DJI stands at a leading position in respect to both market share and the sales volume of 2018.

On the 3rd September 2018, crop protection service by DJI agricultural drone reached accumulatively over 100 million Mu (6.67 million Ha) of crop land. China has 2.025 billion Mu (134.8 million Ha) of cultivated land, DJI, as a single-brand product, has made the breakthrough in servicing of 100 million Mu (6.67 million Ha) of crop land. This indicates the widespread recognition and acceptance of DJI products all over China, which also stands for a new beginning of the Chinese aerial crop protection development.

In order to continue our optimization of aerial crop protection service, in this year DJI has entered into cooperation with prime research institutions and enterprises. In the first half of 2018, DJI executed agreements with Syngenta, DowDuPont and BASF to release aerial crop protection-dedicated products and application standard to continuously improve the effectiveness and efficiency of pesticide applications by agricultural drone.

Furthermore, DJI has signed agreements with China Agricultural University, South China Agricultural University and the Institute of Plant Protection of Chinese Academy of Agricultural Sciences. A united lab on research of agricultural drone has been set up to engage researches of continued optimization of agricultural drone in the future.

Q2. What products have been launched by DJI Agriculture so far and how is the effect of pesticide application?

Since 2009, DJI started research of aerial crop protection, supported by the gathered earliest aerial crop protection professionals, which facilitated DJI to be China's aerial crop

protection pioneer. In December 2015, DJI's first agricultural drone MG-1 was released to market. After 2-year optimization and upgrading, DJI launched its MG-1P in December 2017. This product improves working efficiency greatly, and could handle applications of 90 Mu (6.0 Ha) of crop land with 1 hour, which has a 30% higher efficiency than the earlier product of MG-1. Furthermore, DJI's MG-1P has the useful functions of night operation, landform-adjusted flying and several drones being controlled by 1 controller, which effectively increases the effect of pesticide applications.

Through the initiative, the easy-to-use drones and effective pesticides are developed together, plus a satisfactory technical service, so we can serve our clients better. This is the only correct approach to the success of aerial crop protection, in the long run.

In February 2018, DJI conducted a very challenging trial in Jiangmen, Guangdong Province, China, where a 4-people team did cycle operations and calculated the efficiency of operation. During the trial, the work team used DJI's software PC GS PRO to operate 4 MG-1P drones. It took only 3 hours and 40 minutes to complete spraying of 1,000 Mu (66.6 Ha) of crop land, starting from operation preparation till end of operation.



Chen Tao

The Marketing Director of DJI Agriculture Department China

Q3. What do you think of the current situation of UAV crop protection in China and what are the existing problems? What is the future development planning of DJI Agriculture?

According to statistics, the proportion of China's cultivated land using aerial agricultural technologies is only 1.7%, which means that there is a large potential market for the industry. This also indicates that the market is not established yet, meaning that the development of the industry may still last long. Agriculture is a market of big investment and long period of development with slow return of investment.

Compared to manual operation, agricultural drone application is of high efficiency and safety, but it is still a long way to go to until



an ecological market is established. The popularity of aerial crop protection-related knowledge, buildup of sales and service network and the setup of crop protection business mode all require large investment and long-term operation.

After 2-year in-depth market exploration, DJI could come up with a business objective of “no pursuit for immediate profit, but to help crop protection service providers to create benign cycle of business mode towards a sound ecological environment.”

Since 2018, the availability of governable subsidy and the promotion of unified crop protection practicing system have brought a positive impact to the development of agricultural drone applications. DJI has played an active role in promotion of agricultural drone applications in China, actions taken by DJI include submission of information to assist crop protection service providers in applying for subsidy, assistance in organization of crop protection resources in support of the implementation of unified

crop protection practicing system. However, rapid development of agricultural drone will still rely on the commercial success of crop protection service. When crop protection service comes to the attention of venture capital, a milestone of agricultural drone will really begin.

On the other side, agricultural drone still stays in its rapid technical upgrading stage, where single unit efficiency is being raised constantly. While all higher efficient tools are bringing higher earnings to crop protection service providers and farmers, the total demand for agricultural drone naturally becomes less. It is still to be watched closely and explored as how this industry will develop in the future.

DJI is very willing to be a “step stone” for all industries and is open to collaborations with partners that wish to use DJI’s technologies to realize your sweet dreams.

and more than 3,000 village-level pesticide spraying teams throughout the country, serving the protection operations for nearly 10 million Mu (0.667 Ha) of crops.

Integrated farming services will build the organizational support for cost savings, increasing the efficiency of agriculture, and for the promotion of advanced agricultural technologies, while contributing to modernizing China’s agriculture.



Li Weiguo
President of Guangxi Tianyuan Biochemistry Co., Ltd.,

Q2. Could you introduce some of the formulations for drone spraying launched by your company and relevant strengths?

Guangxi Tianyuan started the research and development of formulations for drone plant protection (ULV formulation) in 2008. Since the initial registration in 2011, Guangxi Tianyuan has registered 14 products covering the entire process of rice and wheat pest and disease control, and increased sugar content from sugarcane, including the Chlorantraniliprole licensed by DuPont (now acquired by FMC). The newly registered sugarcane sugar content booster will be released on the market this year. Guangxi Tianyuan has applied for more than 100 invention patents in the

field of drone plant protection, of which more than 80 patents have been granted.

ULV formulations are used in high concentrations and fine mist droplets, requiring excellent product safety, anti-drifting and anti-evaporation properties, which are the important features distinguishing ULV formulations from traditional ones.

A large-scale plant protection service must be supported by highly efficient low-volume and ultra-low-volume concentration pesticide application equipment, which, in turn, requires compatible formulations to safeguard its normal operation. Just as the historical law of productive forces determines the relations of production, the operation of farming services patterns needs the support of highly efficient plant protection equipment and pesticide products.

Q3. What problems did you company encounter during the implementation of “integrated farming services”? How can you solve such problems?

To implement integrated farming services and business transformations, the most difficult is to change the thinking and behavior patterns of channel operators and employees. To tackle this dilemma, it is necessary to supplement new talents for the

company and find new channel operators who believe in the concept of farming services.

Q4. What do you think about the current agri-inputs industry in China? What new layouts and plans will Guangxi Tianyuan have?

With the size expansion of individual farms in China’s farming industry, a transformation to links shortened and functions integrated is taking place in China’s agri-inputs sector. Channel operators should shift from direct selling products to product sales driven by labor services.

In response to this transformation, Guangxi Tianyuan needs to be equipped with new capabilities to serve plant protection and farming service providers. Therefore, Guangxi Tianyuan should operate its pesticide business at a higher perspective. In addition to continuing the existing formulation business, we will focus on innovating products and technologies in the industrial field where crossover area exists between pesticides and agricultural machinery, pesticides and fertilizers, and pesticides and seeds, so that we can provide more competitive products and technical support to integrated farming services providers.

Guangxi Tianyuan: Integrated farming services to help transform and upgrade China's agriculture

Q1. Could you please introduce the positioning and development model of Guangxi Tianyuan, as well as your achievements in recent years?

Guangxi Tianyuan positions itself as an assistant to integrated farming services provider, rather than as an integrated farming services provider. In our opinion, the main players engaged in integrated farming services in the future should be the platform providers in counties and their cooperative farming services managers. Based upon this concept, Guangxi Tianyuan has been, in recent years, vigorously supporting agri-inputs wholesalers who have cooperated with us for many years, or those who have never done business with us but agree with the concept of farming services. By providing these wholesalers with highly effective pesticides, pesticide application equipment and other highly efficient agricultural machinery, such as sugarcane harvesting machines and mobile dryers, Guangxi Tianyuan supports them in the transformation to plant protection and becoming integrated farming services providers.

For supporting the transformation of agri-inputs channel operators, the use of UAV plant protection is only one of the means. China has both a diverse terrain and wide variety of crops. Besides the provision of drones, we also provide our partners with various types of highly efficient plant protection techniques, such as backpack, airborne devices and manned aircrafts suitable for large-area, low-cost operations. By the end of August 2018, we have supported more than 400 county-level platform operators

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