



# Centre for Air Power Studies (CAPS)

Forum for National Security Studies (FNSS)

09/20

## CAN “vUAVs” HAVE A REDEEMING ROLE IN COMBATING THE “B” CBRN THREATS?

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**Keywords:** CBRN, IIT-K, ideaForge, Aerial Spraying, R&D, LUH, BELL-47G-5, Helicopter

### The Threat

The world is in the grip of a “Biological (B)”-war. The only identifiable protagonist in the “B” war is humanity, which is combating a micro-organism. The micro-organism is a virus, which, in the strictest sense, is not even a living organism but a contagion designated “COVID-19 (Coronavirus Disease -2019)”<sup>1</sup>. The COVID-19 is invisible to an unassisted human eye, and its key characteristics, including the exact transmission mechanism, remain unknown and are a subject of intense research. The key known requirement for its survival and propagation, however, remains that of a direct accessibility to a living being. In the ongoing “B” war the human remains the only protagonist, besides the micro-organism, and thus, is its own enemy. Consequently, as on date, it has infected millions of humans causing widespread human, economic and social distress. In the pandemic sweeping the world, the fighting capabilities of the strongest arsenals on the planet have been caught unprepared. As seen in the case of the USS

*Roosevelt* (660 infections/4,865 total crew)<sup>2</sup> and the French Navy’s *Charles De Gaulle* (1000 infections/2000 total crew)<sup>3</sup> aircraft carriers, the invisible enemy has been able to penetrate, virtually undetected, most well-defended and secured spaces, severely affecting their combat potential.

This war, thus, refocuses the attention of military planners on the aspect of well identified threat matrices, collectively known as Chemical Biological Radiological and Nuclear (CBRN) threats. The collective pushback from humanity, even though a bit delayed, has been robust. One of the techniques being used is to isolate the infected and undertake large scale anti-viral disinfectant spraying operations to contain the spread. Some of these spraying operations have been undertaken using drones.

In an Indian context, our military formations are equally susceptible to the virus and Raksha Mantri Shri Rajnath Singh has even termed the ongoing “B”-war as the “biggest

invisible war” and has stated that the assets of Armed forces are adequately protected.<sup>4</sup> Amidst the ongoing efforts, the military formations also need to review their counter CBRN warfare capabilities and adopt a multipronged approach. This approach also needs to proactively exploit the potential of emerging technologies. One of the key emerging technologies is the availability of “Verti-Lift” Unmanned Aerial Vehicle (vUAV<sup>5</sup>) to undertake counter CBRN<sup>6</sup> operations. The concept of using airpower to combat the “B” threat is not a new one in an Indian context, and has been used decades earlier also.

### Counter “B” Threat Aerial Operations: Indian Context

The earliest aerial spraying operation against a biological threat in India – locusts at the time – was undertaken in 1952<sup>7</sup> by American pilots flying the Piper Cub aircraft under the Technical Co-operation Agreement (TCA) signed between United States and India on January 05, 1952.<sup>8</sup> A total of 45,545 acres was covered, and for future operations, it was recommended that Ministry of Defence be tasked for providing the planes and the pilots. At the time, provision had also been made in the budget of 1953-54 for purchase of two helicopters for anti-locust operations.

That project did not fructify as the focus then was on indigenisation, but years later the ministry tasked Hindustan Aeronautics Limited (HAL) to make a suitable platform, projecting a requirement of around 300 aircraft for

agricultural operations.<sup>9</sup> The Ministry of Food and Agriculture, despite favouring the fixed wing aircraft, also offered a substantial government subsidy for aerial spraying of up to 75 percent of the operating cost to all private operators.<sup>10</sup>

One of the first private operators off the block was Pushpaka Aviation which acquired the Bell 47G-5s in 1969 and undertook aerial spraying operations in Maharashtra, Gujrat, Punjab, Karnataka and Kerala. Many a time these helicopters, flown by a former Indian Air Force (IAF) pilot, covered over 2000 acres per day.<sup>11</sup> The fixed wing aircraft designed and built by HAL for agricultural spraying was designated as “Basant” and had its first flight on March 30, 1972.<sup>12</sup> However, the world over, as the adverse effects of pesticides on human populations became apparent,<sup>13</sup> large scale indiscriminate spraying operations were terminated. This also meant that most of the capability and skill sets acquired /developed to undertake spraying operations by helicopters and fixed wing aircraft were also lost to the annals of time.

Thus, aerial spraying effort in India, which had commenced with a battle against the locusts, ended due to the adverse impact of the chemicals being sprayed. However, the thought process of undertaking efficient aerial spraying operations needs to be revived, this time for enhancing military preparedness. This is especially so with the increased availability of compact Unmanned Aerial Systems (UAS).

### “vUAVs” in Counter-CBRN Role

As the Covid-19 pandemic spread in different countries, images of multi-rotor UAS undertaking spraying operations also started filling the news space.<sup>14</sup> The tank capacity of these systems presently is limited to approximately six litres.<sup>15</sup> However, one of the most efficient vUAV in the world today is the Yamaha FazerR which can carry 32 KGs of payload.<sup>16</sup> This is also indicative of the possibility that a conventional tail rotor and main rotor configuration is still the best configuration for a vUAV for military applications. However, for this very reason, the technological access to the system remains highly protected.

Therefore, in an Indian context, what is the best possible way forward? The good news is that there is recognition of a requirement of such a system. This is evidenced by the fact that a highly experienced and multi-talented team is working on vUAV systems of at least three weight categories of 10 Kg, 50Kg and 200 Kg weight classes.<sup>17</sup> However, on the flip side, this remains largely an academia driven project. This approach needs to be tweaked and converted to a top-down driven military requirement, as a part of its preparations to counter CBRN threats.

### The vUAV Flight Plan

In its report submitted on December 22, 2014, one of the key recommendations by the Standing Committee on Defence stated:

*“...that the Ministry of Defence and DRDO should be pro-active in foreseeing the future challenges of NBC threat and work towards decimating its menace.”<sup>18</sup>*

The current Covid-19 pandemic thus provides an opportunity to revisit these recommendations as a part of our preparations to counter CBRN threats. One of the technological advancements which need to be made a part of the overall plan is that of a vUAV. The vUAV in general has the potential to be a multi-utility platform, which, depending upon its payload, can be used for multiple roles. These may range from being a reconnaissance vehicle for detection of emerging CBRN threats through installation of onboard sensors, to means of identifying and demarcating the containment zones, thereby significantly augmenting the capabilities of ground-based systems.

However, for this effort to be successful, a focussed multi-disciplinary approach under a single task force is necessitated. On the one hand, top priority must be given to the 200Kg vUAV project being developed by IIT-Kanpur, while at the same time feasibility of converting the now matured Light Utility Helicopter (LUH)<sup>19</sup> project of the HAL into a vUAV must be explored. In addition, other private entrepreneurs in India, who are doing R&D in the field, also need to be encouraged.<sup>20</sup> Concurrently, the development of payloads and associated sub-systems which would constitute the cutting edge of the system, also needs to commence. In this manner the

vUAVs would significantly enhance military options to counter the entire range of CBRN threats facing the nation.

***(Disclaimer: The views and opinions expressed in this article are those of the author and do not necessarily reflect the position of the Centre for Air Power Studies [CAPS])***

#### Notes

<sup>1</sup> WHO, "Coronavirus", [https://www.who.int/health-topics/coronavirus#tab=tab\\_1](https://www.who.int/health-topics/coronavirus#tab=tab_1) accessed April 16,2020

<sup>2</sup> Matthew Impelli, "660 Crew Members on Theodore Roosevelt Test Positive for Coronavirus" Newsweek, April 17,2020, <https://www.newsweek.com/660-crew-members-uss-theodore-roosevelt-test-positive-coronavirus-1498612> accessed on April 18,2020

<sup>3</sup> France24.com, "France finds more than 1000 Covid-19 cases on flagship aircraft carrier- April 17,2020", <https://www.france24.com/en/20200417-france-reports-40-of-aircraft-carrier-group-crew-test-positive-for-covid-19> accessed on April 18,2020

<sup>4</sup> Times of India, PTI, "Coronavirus crisis 'biggest invisible war'; Armed forces and military assets adequately protected:Rajnath" Apr 19,2020, <https://timesofindia.indiatimes.com/india/coronavirus-crisis-biggest-invisible-war-armed-forces-and-military-assets-adequately-protected-rajnath/articleshow/75232554.cms> accessed on April 21,2020

<sup>5</sup> vUAVs :Vertical take-off and landing Unmanned Aerial Vehicles, is a term used for all types including both Fixed wing as well as rotary wing ones, capable of operating from restricted areas

<sup>6</sup> The entire CBRN spectrum is included as only the payload and operational deployment may vary for the same aerial vehicle (vUAV)

<sup>7</sup> GoI, Ministry of Food & Agriculture, Seventh Report (1953-54) of the Estimates Committee on the Ministry of Food and Agriculture", Para 44, [https://eparlib.nic.in/bitstream/123456789/4388/1/ec\\_1\\_7\\_1954.pdf#search=helicopter](https://eparlib.nic.in/bitstream/123456789/4388/1/ec_1_7_1954.pdf#search=helicopter) accessed on April16,2020

<sup>8</sup> Ibid. & United States Govt. Printing Office Washington:1953 "Report of Special Study Mission Pakistan,India,Thailand and Indochina May 6,1953" p.75

<sup>9</sup> GoI, Ministry of Defence, "Committee On Public Undertakings (1967-68): Eighth Report (Fourth Lok Sabha) Hindustan Aeronautic Limited, Lok Sabha

Secretariat New Delhi March,1968/Chaitra,1890(Saka), pp.27-28

<sup>10</sup> GoI, Public Account Committee (1972-73) Sixtieth Report " Action taken by Government on the Recommendations of the Public Accounts Committee contained in their 28th Report (Fifth Lok Sabha) on Audit Report (Civil),1970 relating to the Ministry of Foreign Trade and Department of Agriculture" [https://eparlib.nic.in/bitstream/123456789/4532/1/pac\\_5\\_60\\_1973.pdf#search=%20Helicopter](https://eparlib.nic.in/bitstream/123456789/4532/1/pac_5_60_1973.pdf#search=%20Helicopter), p.24

<sup>11</sup> Shrikant Kotnis, "Bell G-47 [VT-DXE]- An appeal from its engineer", Warbirds of India <http://www.warbirds.in/maharashtra/374-bell-g-47-vt-dxe-an-appeal-from-its-engineer.html> accessed on April 19, 2020

<sup>12</sup> Rasheed Kappan, "Agriculture from the Air : Basant to Air Tractor", Deccan Herald, Feb 22,2017, <https://www.deccanherald.com/content/597625/agriculture-air-basant-air-tractor.html> accessed on April,17 2020 & Joe Thomas, "A Legend And A Gentleman Wing Commander Inder Mohan Chopra AVSM 03 MAY 1932 – 30 March 2015" <http://nebula.wsimg.com/1fb0e8620f8e4fccd05f7f412c3e1e96?AccessKeyId=63547DE19B32232E527E&disposition=0&alloworigin=1> accessed on April 19,2020

<sup>13</sup> Basavraj Kodsas, "Negative Impact of Pesticide Usage in Agriculture", Slide 27, <https://www.slideshare.net/basavarajkodsakodsas/negative-impact-of-pesticide-usage-in-agriculture> accessed on April 19,2020

<sup>14</sup> The Economic Times, "COVID-19:Drones,mist cannons, creativity speed up disinfection work in TN- April11,2020" <https://economictimes.indiatimes.com/news/politics-and-nation/covid-19-drones-mist-cannons-creativity-speed-up-disinfection-work-in-tn/articleshow/75092159.cms?from=mdr> accessed on April 17,2020

<sup>15</sup> Ibid.

<sup>16</sup> Yamaha, "Precision Agriculture", <https://www.yamahamotorsports.com/motorsports/pages/precision-agriculture-fazer-r> accessed April 19,2020

<sup>17</sup> GoI, Ministry of Science and Technology, "IIT-K develops unmanned helicopter useful for agriculture, mapping, & surveillance", <https://dst.gov.in/iit-k-develops-unmanned-helicopter-useful-agriculture-mapping-surveillance> accessed on April 19,2020

<sup>18</sup> GoI, Ministry of Defence, Fifth Report Standing Committee On Defence (2014-2015) Sixteenth Lok Sabha Ministry Of Defence Demands For Grants (2014-2015) Ordnance Factories And Defence Research And

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<sup>19</sup> HAL-India, "LUH Receives IOC, Fillip to Indigenous Programme, Feb 07,2020", [https://hal-india.co.in/LUH%20Receives%20IO/ND\\_292](https://hal-india.co.in/LUH%20Receives%20IO/ND_292) accessed on April 19,2020

<sup>20</sup>Janes, "Flying high: India's indigenous UAV programmes "  
[https://www.janes.com/images/assets/793/77793/Flying\\_high\\_Indias\\_indigenous\\_UAV\\_programmes.pdf](https://www.janes.com/images/assets/793/77793/Flying_high_Indias_indigenous_UAV_programmes.pdf) accessed on April 23,2020

