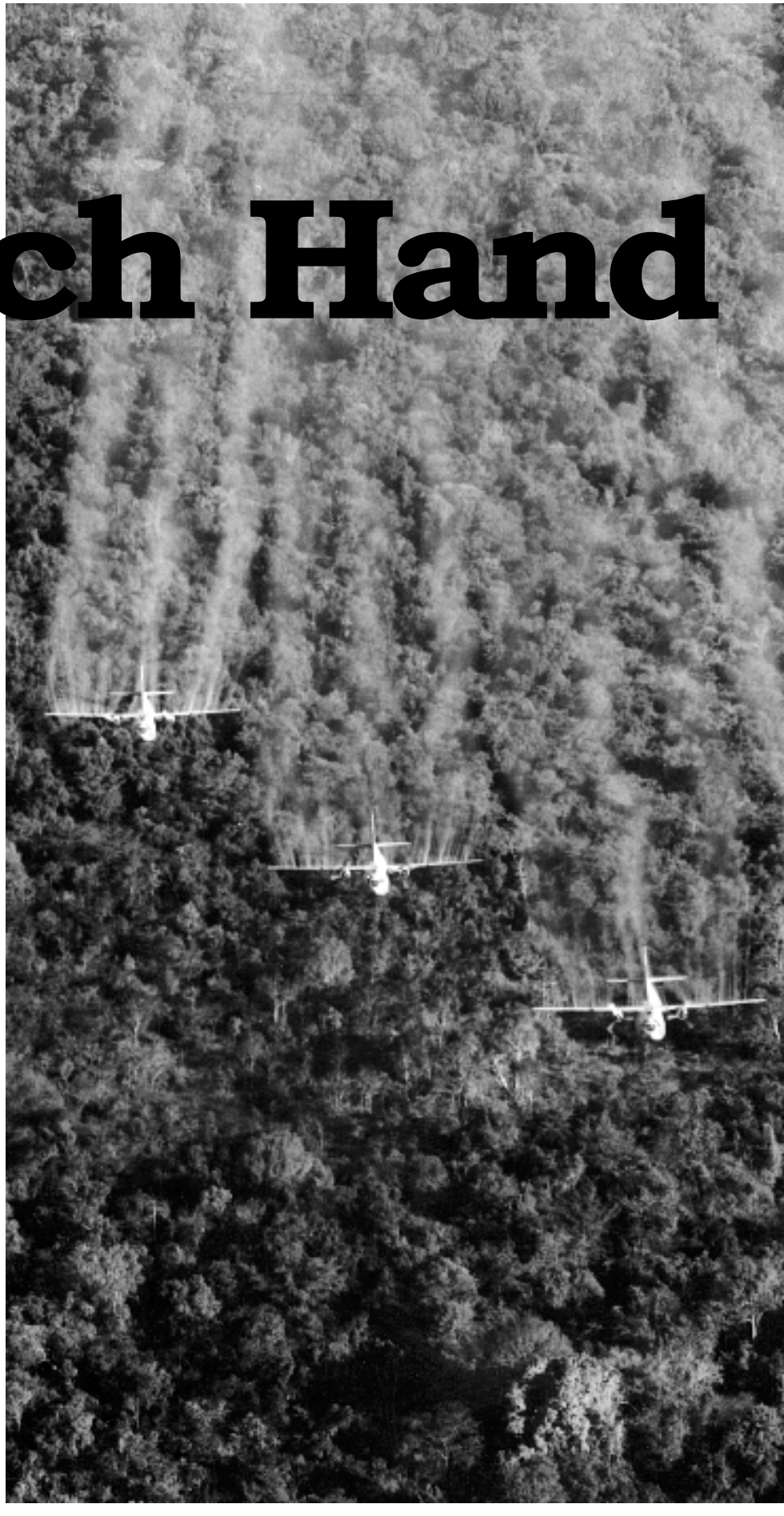
Even then, the defoliation missions over Vietnam were controversial.

Ranch Hand

By Walter J. Boyne



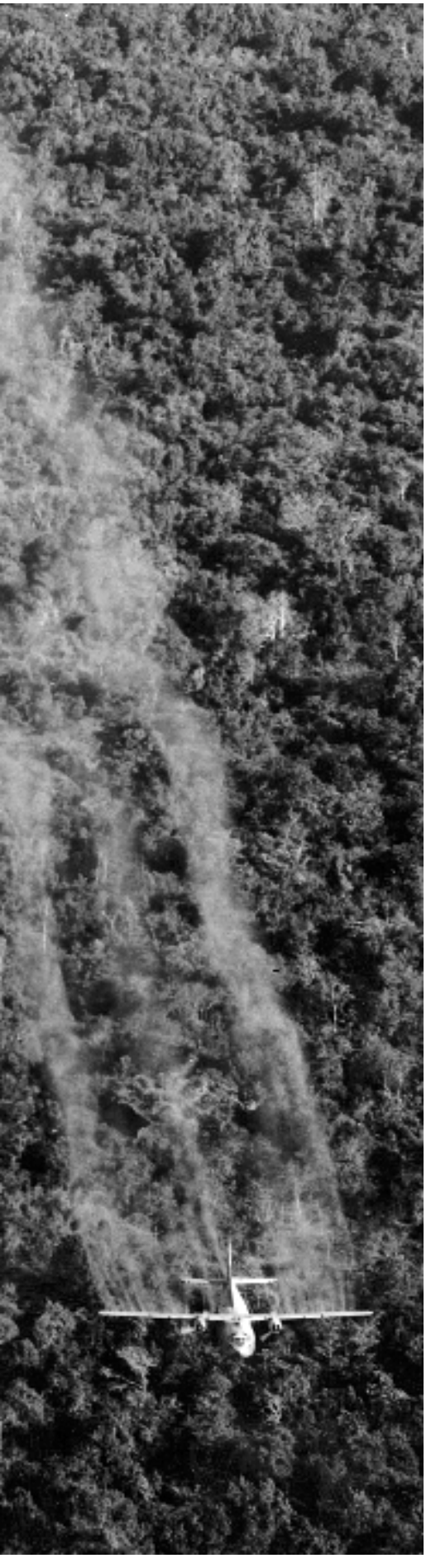
It was an unheralded mission, unfolding over nine long and dangerous years. Even by the standards of the Vietnam War, it was politically sensitive, and national political leaders tended to recoil from discussing it. At its cutting edge were old, unarmed aircraft making low and slow flights, straight into enemy fire.

That is the way it was for the men of Operation Ranch Hand, the Air Force's long-running campaign to defoliate jungles and, in so doing, deprive the Communist forces of concealment cover and food supplies. Ranch Handers had the hot, smelly, and dangerous job of spraying chemical herbicides over large expanses with maximum enemy presence and minimum protection.

They flew their obsolescent UC-123s with abandon, hurling them at times into 60 degree banks at treetop level, taking hits on virtually every mission. Their success could be measured in the fact that they always were in high demand. In fact, Air Force officials never could provide enough crews and airplanes to satisfy the requests of US ground commanders.

They were unsung heroes. Neither those who flew on the missions nor those who supported them have received the credit deserved. The men of Ranch Hand accept this, for they were an unusual breed, regarding anti-aircraft hits and casualties as badges of honor. They were never a spit-and-polish outfit.

The basis for Ranch Hand was simple. Americans fighting in the



field wanted the jungle growth stripped from camp perimeters, lines of communication, and the Ho Chi Minh Trail, to better prevent ambushes by exposing the endless flow of North Vietnamese infiltrators and assisting in their destruction. Under the call sign "Cowboy," Ranch Hand aircraft met these demands day after day by plunging into heavy gunfire over enemy-held terrain. Their hard work saved the lives of many US and South Vietnamese troops.

Statistics give some measure of the effort exerted by the force. Between 1962 and 1971, Ranch Hand operators flew many thousands of sorties and sprayed more than 9,000 square miles of terrain. They delivered some 19 million gallons of herbicide, 11 million of which were Agent Orange, the controversial defoliant that has been the subject of numerous inquiries (see box).

The Start

The effort was launched in January 1962, with only three airplanes. For most of the campaign, Ranch Hand didn't have more than 20 aircraft and never exceeded 33. Five aircraft were lost in combat (one was on a training mission but presumed lost to ground fire). The Ranch Hand unit was shot at and hit more frequently than any other Air Force unit in the Vietnam War. One survivor—an icon to Ranch Hand veterans—is "Patches," a UC-123K (serial number 56-4362), on display at the Air Force Museum in Ohio. Many metal skin patches cover the damage of many of its 1,000 battle hits.

The Ranch Hand organization had a series of designations. Names ranged from Special Aerial Spray Flight to 12th Air Commando Squadron to 12th Special Operations Squadron to A Flight of the 310th Tactical Airlift Squadron. Whatever the designation, the mission always was flown by air commandos.

Ranch Hand may have lacked glamour, but not danger. Losing an engine on takeoff or when spraying in mountainous areas meant that a crash was a near certainty, unless the overgrossed UC-123 could immediately dump its load. Crew members faced other hazards such as the need to make steep turns at 150 feet altitude in an aircraft with a 110-foot wingspan. Also to be feared were midair collisions with the local fruit bat type, an enormous creature whose wingspan often extended 5 feet.

Then there were the nighttime Viet Cong mortar attacks, sabotage on the base, and relentless small arms and .50-caliber machine gun fire as a spray run began. It was a mission that could be carried out only by skilled personnel. It generated high morale and genuine camaraderie sustained to this day by some 1,200 Ranch Hand veterans.

During post–World War II years, the Air Force established a Special Aerial Spray Flight for insecticide work, using the C-47 as its basic flight vehicle. SASF became the focus of a series of complementary if unrelated events that decades later would make Ranch Hand possible.

A 1952 engineering study led Hayes Aircraft Corp. to build the MC-1 aerial spray system, which came to be known as "Hourglass." It comprised a 1,000-gallon aluminum tank, a centrifugal pump, control valve, pipes with six spraying nozzles, emergency dumping system, and miscellaneous equipment.

Hayes produced 100 units, but plans for their use were dropped and they went into storage, where they lay untouched and virtually forgotten. Eight years later, an SASF stalwart, Capt. Carl W. Marshall, proposed replacing the C-47s with C-123s, noting that these could be used to dispense insecticides and defoliants. Marshall's search for equipment led to the Hourglass cache, which was well-suited for use in the C-123.

White House Interest

Meanwhile, Presidential Advisor Walt W. Rostow, a prime advocate of increased US intervention in Southeast Asia, had become interested in using herbicides, perhaps as a result of South Vietnamese President Ngo Dinh Diem's calls for the US to spray Viet Cong crops to deny them food.

From the first, senior US officials were totally aware of the political dangers and the near certainty that American use of herbicides would become a propaganda windfall for the Communists. For that reason, and despite the high level of interest, things would move slowly for a while. US officials, concerned about charges of biological and chemical warfare, were in the grip of extreme caution.

On Nov. 30, 1961, President Kennedy accepted the joint recommendation of the State Department and Pentagon that the US proceed with a limited herbicide effort characterized by discriminate target selection and execution.

In response, Tactical Air Command sent six C-123s to Olmstead AFB, Pa., for required reconfiguration. At Olmstead, the airplanes were equipped with MC-1 tanks and stripped of all unnecessary equipment. They were fitted with an engine oil supply replenishment system. Spray booms were installed along trailing edges of the wing. Later, they went behind the tail.

In early December 1961, with all C-123s having received their planned equipment changes, the aircraft redeployed to Clark AB in the Philippines. The long-distance flight proved the capability of the C-123. On Jan. 7, 1962, three C-123s were deployed to Tan Son Nhut in Vietnam as a part of the 346th Troop Carrier Squadron.

The sensitivity of herbicidal warfare became apparent. Despite urgent pleas from the field, officials debated at length whether the C-123s should be disguised with South Vietnamese insignia and flown by USAF crews in civilian clothes. As the origin of the aircraft could not be denied, this idea was abandoned. Also serving to delay full implementation of the program was the fact that local stocks of herbicide were limited.

The delays disconcerted the Ranch Hand crew members, all of whom were volunteers. They found themselves quartered in a tent city without much to do, their aircraft parked in the same secure area at Tan Son Nhut that housed President Diem's squadron of fighters commanded by Lt. Col. Nguyen Cao Ky. While Ranch Hand had bosses at many levels—TAC, 2nd Advance Echelon, Military Assistance Advisory Group Vietnam, 13th Air Force, and Pacific Air Forces—it had little supervision. Few at any level of command knew how to execute the mission or how to evaluate its results.

Self-Taught

Fortunately, Ranch Hand crews knew they had much to learn and much to do. There were no tactical manuals and no doctrine for herbicidal warfare. They knew virtually nothing about how the various types of trees and other vegetation would react to herbicide. Nor did they know the quantity per acre of herbicide that would be required. Maps were few, intelligence was lacking, weather briefings were inaccurate, and no one was sure how to solve the operational problems posed by wind, temperatures, and terrain. Moreover, the prospective degree of enemy opposition was a totally unknown factor.

On Jan. 13, 1962, Marshall formally initiated the Ranch Hand program. He and Capt. William F. Robinson Jr. took off and sprayed along Route 15, flying at 150 feet altitude and at a speed of 130 knots. Also on board were a flight mechanic, an Army scientist, several observers, and the required Vietnamese "aircraft commander."

The first series of missions went well, as the Ranch Hand crews began teaching themselves their business. The pilot flew with both hands on the yoke, maintaining vertical and horizontal spacing in formation, and controlling the spray pump with a switch. The copilot maintained fore-and-aft spacing, monitored the airspeed and altitude, and stood ready to execute the emergency procedures or to take the controls if the left-seater was injured. An aircraft commander soon became one with the airplane, flying with his eyeballs and the seat of his pants because there was little time to look at the instruments.

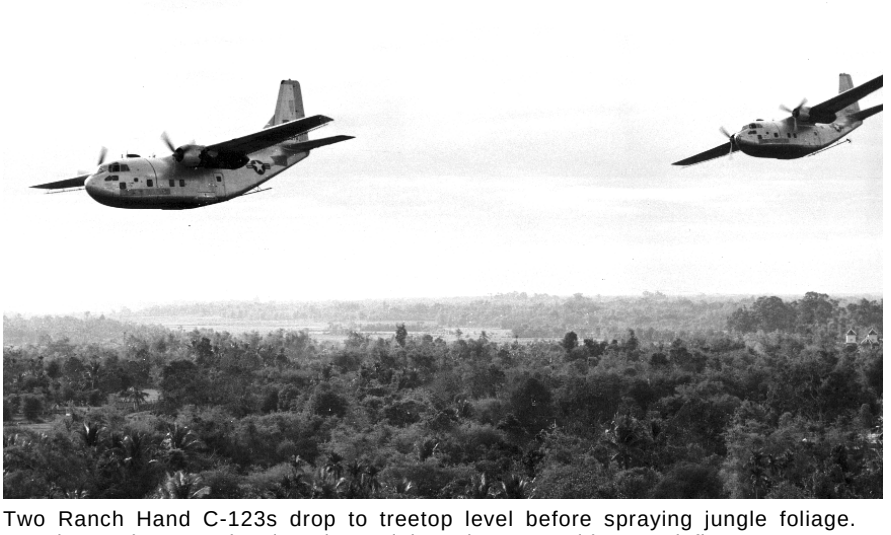
The Ranch Hand crews quickly learned the necessity of surprise. To avoid small arms fire, they made their approaches to the target at 3,000 feet altitude. At a precomputed point, the C-123 would enter a steep, 2,500-feet-per-minute dive, pulling out at 150 feet. At that point, the crew would turn on the spray equipment and let it run for about four-and-one-half minutes. If everything worked as planned, the airplane would lay a swath of herbicide 240 feet wide and 8.7 miles long.

Then the C-123 would make a steep climb to get out of the range of ground fire.

Ranch Hand pilots flew missions in formations of two or three ships in the early days and as many as 10 in the latter stages of the program. Some targets required sharp turns, and the turns required the aircraft to stack up in a "piggyback" formation to avoid being run into the ground.

Later, when crop destruction missions were flown, tactics changed. Exposure to enemy fire could last as long as 45 minutes, compared to about eight to 10 minutes on defoliation runs.

Crews soon learned that they had to spray in the early morning, when ground temperatures did not yet exceed 85 degrees. Once the temperatures went higher, the spray would rise rather than drop to earth. Wind also could be a major problem. If its speed exceeded 10 miles per hour, herbicides would be dissipated over an overly large area and have little effect on vegetation.



Two Ranch Hand C-123s drop to treetop level before spraying jungle foliage. Ranch Hand crews developed special tactics to avoid ground fire, a constant threat since they had to fly slowly and close to the ground for these missions.

At Tan Son Nhut AB, South Vietnam, in 1965, USAF TSgt. Henry E. Heath (in hat) and a South Vietnamese soldier rush to reload a Ranch Hand C-123. Their loading hose was attached to a high-speed mixing tank.

Colored Drums

Ranch Hand used common agricultural chemicals widely used within the United States. These herbicides were shipped to Vietnam in distinctive color-coded drums. This was the origin of the names "Agent Orange," "Agent Blue," "Agent White," and so forth. Despite popular belief to the contrary, Agent Orange did not create an orange-tinged haze when delivered.

The correct amount of coverage was about three gallons of herbicide per acre. The first signs of leaf kill could be seen in as little as four days. A definite color change would take place within two weeks. After two to four months, a sprayed area would appear barren. Forward Air Controllers said vertical visibility improved by as much as 70 percent, permitting them to keep much closer tabs on enemy activity.

As the self-training process went on, so did the evaluation at the highest levels, with Secretary of Defense Robert McNamara monitoring operations and constantly inquiring as to the effect that the defoliants had on both vegetation and operations.

On Feb. 2, 1962, the Air Force lost its first aircraft in Vietnam. It was a Ranch Hand C-123, flown by Capt. Fergus C. Groves II, Capt. Robert D. Larson, and SSgt. Milo B. Coghill. All three died in a still-unexplained crash near Route 15. Soon, Ranch Hand suffered its second loss, in a landing accident. The crew survived, however, and the tempo of spraying operations began to pick up.

All military evaluations of Ranch Hand were positive, and demands for defoliation missions increased as the number of US forces steadily grew. Perimeter areas of fortified camps were studded with mines and barbed wire, but the quick regrowth of jungle vegetation allowed easy infiltration by the Viet Cong. To the US soldiers in the camps, aerial spraying was life insurance, pure and simple, for both offensive and defensive missions.

Ranch Hand would increase its flexibility by expanding operations from its main base—at first it was Tan Son Nhut and then Bien Hoa. Units also flew from Da Nang, Phan Rang, and Nha Trang. The specialized mountainous terrain missions were flown out of Da Nang by crews sent on temporary duty for two weeks at a time.

As the United States committed more and more of its resources to the Vietnam War, worry about the program increased. Protests caused the top leaders to exercise even more authority over target selection and approval. Extremely rigid controls were established, with the result that many months elapsed between the time a province chief or a field commander made a request for a defoliation mission and the date of execution.

Then suddenly, almost offhandedly, Washington stepped aside, granting approval authority to Saigon. Approval for even the most sensitive of the missions, crop destruction, now was in the hands of the new US ambassador, Maxwell D. Taylor, and the commander of Military Assistance Command, Vietnam, Gen. William C. Westmoreland. Eventually, the time between request and mission execution was reduced to about 75 days.

Ranch Hand crews were sent to Vietnam on temporary duty, and this became the preferred practice for years. The temporary duty process was vital for training. When the Ranch Hand crews rotated back to the United States—first to Langley AFB, Va., and later to Hurlburt Field, Fla.—they brought with them the latest information on how to execute the mission. After spending a short period training new crews, veteran personnel would go back to South Vietnam for another tour. Many of crews accumulated several hundred combat missions, and the store of knowledge they built up turned Ranch Hand into a superbly disciplined unit in the air.

Fighter Support

As the Ranch Hand unit improved its capability, the Viet Cong improved their defenses. By late 1963, Ranch Handers saw a marked increase in ground fire. Fighter escorts became an absolute necessity. In April 1964, Maj. Gen. Joseph H. Moore, commander of 2nd Air Division, launched an experimental mission to test the effectiveness of fighter support—in this case four South Vietnamese air force A-1 fighters and four VNAF T-28s. The target was a canal south of Tan Son Nhut, a site of Communist anti-aircraft activity.

Two Ranch Hand aircraft flew down the canal. Capt. Charles Hagerty was in the lead airplane on the left. Capt. Eugene D. Stammer was in command of the No. 2 airplane on the right. Intense .50-caliber machine gun fire riddled Hagerty's airplane, knocking out one engine. Feathering the propeller and dumping his load of herbicide, Hagerty climbed through another burst that tore up the cockpit. The VNAF airplanes attacked the machine gun sites as Hagerty limped to an emergency landing at Soc Trang. His airplane had taken more than 40 hits.

Ranch Hand crews adapted to in-

creasing ground fire with a variety of new tactics, including approaching the target at an altitude of 20 feet and popping up for the spray run. They took maximum advantage of terrain to mask the approach and chose alternative targets so that intense gun fire in one area would simply divert the C-123s to another target. The C-123's limited single engine capability forced them to plan all flights in mountainous areas so that the runs were made downhill. Even so, missions in areas such as the A Shau Valley were so dangerous that losing an engine usually meant losing the aircraft.

As the war heated up, spray missions always flew with a FAC and with a fighter escort. Targets were analyzed, and meetings were held with the fighter unit to assess the expected level of danger. Some "hot" targets had to be softened up with napalm, cannons, and cluster bombs. On other occasions, the fighters waited until they saw anti-aircraft fire before beginning their suppression runs. Guns were usually visible first to the crews of the spray airplanes. They would drop smoke grenades to mark the place of origin on dangerous ground fire.

Agents of Controversy

Critics of the use of herbicides were vocal during the Vietnam War and again when questions were raised in this country about the effects of the ominously named Agent Orange. The debate still rages.

US forces used 10 different herbicides in Southeast Asia, most of them variants of 2,4-D (D for dichlorophenoyxyacetic acid) or 2,4,5-T (T for trichlorophenoxyacetic acid). Others included sodium salt of cacodylic acid and triisopropanolamine salt of picloram.

The names "Pink," "Green," "Purple," "Blue," "Orange," and so on came from the 4-inch-wide band painted on the 55-gallon drums containing the herbicide. The herbicide contained in orange-striped drums came to be called "Agent Orange." A 50–50 solution of 2,4-D and 2,4,5-T, it was the most widely used of the herbicides and gained the most notoriety.

All of the herbicides used in Southeast Asia had been used in commercial agriculture for many years. As an example, in the United States in 1961, about 40 million acres were treated with 2,4-D and 2,4,5-T herbicides.

Among the many myths about herbicide spraying was that forest areas were "drenched" with spray that "soaked" clothing of those on the ground. In actual practice, the dispensation of three gallons of herbicide per acre is the equivalent of about .009 of an ounce per square foot. In most instances, only about 6 percent of the sprayed material reached the ground, the rest being absorbed by the jungle foliage. Drenching and soaking did not occur.

Dioxin was present in Agent Orange, but only as a trace amount—.0002 of 1 percent, and this amount was degradable by sunlight within 72 hours.

Over the past 18 years, Ranch Hand veterans have participated in a $120 million epidemiological study—the Air Force Health Study, commonly called the Ranch Hand Study. The participants received physical exams in 1982, 1985, 1987, 1992, and 1997. The final physical exams are scheduled for 2002. Although Ranch Hand personnel naturally had the greatest degree and frequency of contact with the herbicides, physical examinations at the Kelsey–Seybold clinic in Houston and the Scripps Clinic and Research Foundation in La Jolla, Calif., reveal that the mortality rate of the group is the same as a matched comparison group (Air Force veterans who flew in C-130s in Southeast Asia during the Ranch Hand time frame) and significantly lower than the rate for the male population of the United States. The number of birth defects among children of Ranch Hand veterans is the same as the children of the comparison group.

The testing of Ranch Hand veterans will conclude in 2006, at which time a report will be prepared.

In Demand

The demand for missions grew swiftly by 1965 as the complement of Providers (now designated UC-123) grew to seven. The Ranch Hand ground crews had learned to reduce turnaround times between sorties to about 10 minutes, allowing aircrews to fly as many as six sorties in three hours with two aircraft.

MSgt. James C. Kafferly (center), a flight line supervisor, inspects a Ranch Hand aircraft for damage, in this case a hole ripped open by a .50-caliber bullet.

As Ranch Hand operations expanded, Hanoi, Beijing, Moscow, and anti-war groups in the United States all launched propaganda barrages. They claimed the US was engaged in wholesale elimination of forests and blamed the US for an assortment of human ills, which were demonstrably false, but the charges had a curious reverse effect. The Viet Cong evidently believed the propaganda and often fled, and even surrendered, during the early period of herbicide application.

Though protests continued, Ranch Hand missions increased swiftly, and more aircraft were added to the unit. In May 1964, Ranch Hand flew only 20 sorties. In May 1966 it flew 244. Other missions were laid on. These included spraying the Ho Chi Minh Trail in Laos, conducting insect control in Thailand, and carrying cargo.

USAF made primitive attempts to improve crew safety. The efforts included installation of additional cockpit armor and new helmets with visors to guard against glass and

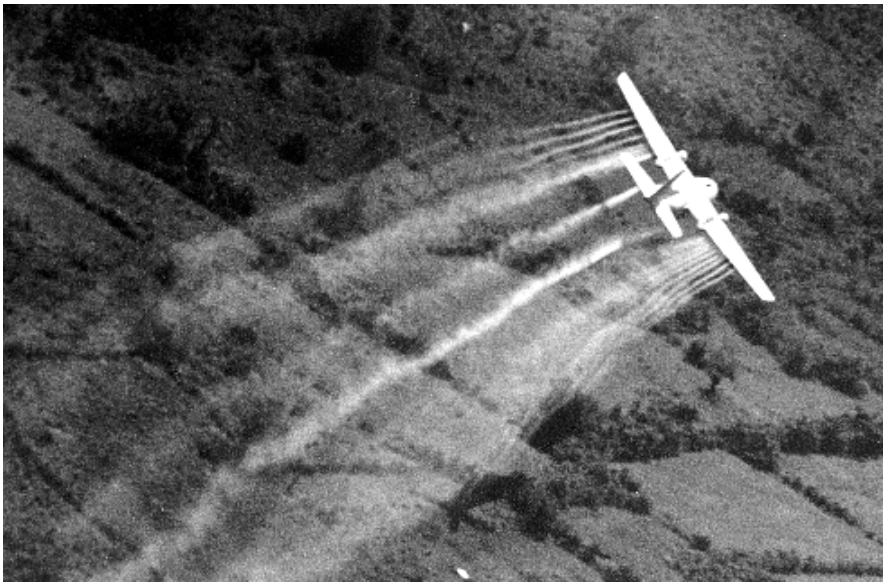
Plexiglas splinters. Crews wore and sometimes sat upon flak jackets. USAF built an armor-plated box for the flight mechanic in the cargo hold.

The first known combat loss of a Ranch Hand aircraft took place on June 20, 1966. Two UC-123s were making multiple passes on a target in Quang Tin province. Both were hit on each of the first four passes, but they pressed on for a fifth spray run. On the fifth pass, heavy machine-gun fire shot an engine out on the aircraft of Lt. Paul L. Clanton. The aircraft crashed, trapping Clanton in the burning wreckage. He was saved by the efforts of his crew—Lt. Steve Aigner and SSgt. Elijah R. Winstead. As the escort fighters bombed and strafed the Viet Cong, Winstead used his personal weapon to provide covering fire. A Marine assault team of six helicopters rescued them.

The Ranch Hand workload increased in direct proportion to the increase in American activity in Vietnam. When, in time, the US began to leave Vietnam, the number of missions declined. Arranging a mission was still a bureaucratic nightmare, with many US and South Vietnamese agencies involved, but Ranch Hand crews always had plenty of targets.

In December 1966, the Ranch Hand operation moved its headquarters to Bien Hoa, where the ramp was less crowded, and a special "herbicide farm" was set up to speed the turnaround process. This greatly increased USAF's capability but at a cost of higher casualties.

Continuous exposure to danger transformed some Ranch Hand crewmen into adrenalin junkies. When required to perform routine cargo duties, as during the 1968 Tet Offensive, they quickly became bored and longed to get back to the spraying operation. As an indication of the degree of difference in hazard, the Ranch Hand unit averaged a hit every six missions when flying spray missions. During the almost 3,000 cargo missions they flew during Tet, they received only one hit.



A C-123 sprays jungle growth and thickets in South Vietnam. Forward Air Controllers said vertical visibility improved as much as 70 percent as a result of Ranch Hand defoliation missions.

Joy of Jets

In early 1968, UC-123K versions of the Provider began to arrive. The new model had a more powerful GE jet engine mounted under each wing, anti-skid braking, improved armor, a better pumping system, and numerous other refinements. The extra power was used on take off, the climb outs afterward, and of course during emergency conditions. The offsets to the increased power were increased weight and higher fuel consumption, both gladly accepted by the Ranch Hand crews, in exchange for the blessed power of the jets. The new airplanes were not invulnerable, however, and a UC-123K was lost on May 24, 1968.

However, the value of the jet engines was indisputable. This was proven dramatically on Dec. 13, 1968. On that date, Lt. Col. Winthrop W. Wildman was hammered by automatic weapons fire while leading a six-airplane formation north of Bien Hoa. His airplane rolled rapidly to the left. Only by applying full left rudder and full right aileron, with his right jet engine at idle and his left jet at full power, was Wildman able to herd the UC-123K back to Bien Hoa where they landed safely after a risky approach. Without jet engines, they would have crashed.

The years 1968 and 1969 saw a continued high level of activity. Crews had become highly proficient in their tasks, and spraying, whether defoliating or destroying crops, was as routine as it could be for airplanes that were still flying at 130 knots, 150 feet off the ground, in the face of gunfire.

Even so, political support for the program was rapidly disappearing as a result of continual political protests at home and abroad. As the US involvement in Vietnam wound down, so did Ranch Hand missions—from an average of 400 sorties per month in 1969 to only 43 in the last quarter of 1970. By then, the handwriting was on the wall. Ranch Hand was going to shut down, even though the demand of local commanders was as high as ever. The Defense Department "temporarily" halted all spraying of one particular herbicide, Agent Orange, in April 1970. That ban was never lifted, despite protests from the military.

The program was phased out over the next year as the amount of spraying declined dramatically and the number of Ranch Hand aircraft dwindled without replacement. The men of Ranch Hand flew their final three herbicide missions on Jan. 7, 1971—nine years to the day after arrival of the first spray airplane at Tan Son Nhut. ■

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