LIMITED OCCURRENCE INVESTIGATION REPORT – FINAL

Reference Number	CA18/2/3/10580										
Classification	Accident		**Date**	24 April 2025			**Time**	0815Z			
Type of Operation	Agricultural Operations (Part 137)										
Location											
Place of Departure	Porterville Airstrip, Western Cape Province		Place of Intended Landing			Porterville Airstrip, Western Cape Province					
Place of Occurrence	On a citrus farm, approximately 20 kilometres (km) north of Porterville Airstrip, Western Cape Province										
GPS Co-ordinates	Latitude	S32°37'30.0”	Longitude	E18°56'17.0"		Elevation	442 feet				
Aircraft Information											
Registration	ZS-KHR										
Make; Model; S/N	Piper Aircraft; PA-36-375 Pawnee Brave (Serial Number: 36-7802059)										
Damage to Aircraft	Substantial			Total Aircraft Hours		9 072.01					
Pilot-in-command											
Licence Type	Commercial Pilot Licence			Gender	Male			Age	63		
Licence Valid	Yes	Total Hours	9 871		Total Hours on Type			4 717			
Total Hours Past 30 Days	2.4			Total Hours on Type Past 90 Days		2.4					
People On-board	1 + 0	**Injuries**	0	**Fatalities**	0	**Other (on ground)**		0			

What Happened

On Thursday morning, 24 April 2025, a pilot on-board a Piper PA-36-375 Pawnee Brave aircraft with registration ZS-KHR was engaged in a crop-spraying flight from Porterville Airstrip in Cedarberg, Western Cape province, with the intention to return to the same airstrip. Visual meteorological conditions (VMC) by day prevailed at the time of the flight which was conducted under the provisions of Part 137 of the Civil Aviation Regulations (CAR) 2011 as amended.

The pilot stated that the aircraft had 200 litres (L) of Aviation Gasoline (Avgas) 100 Low Lead (LL) in the tanks during the pre-flight inspection, and that the hopper (located behind the engine fire wall) contained 150L of insecticide. The weather information sourced by the pilot from a website indicated a visibility of more than 10 kilometres (km) and the air temperature of 16° (degrees) Celsius at the time of the flight. After a briefing with the farm owner about the citrus crops to be sprayed, the pilot taxied the aircraft to the threshold of the gravel runway, which was 800 metres (m) in length, and completed the pre-departure checks. Thereafter, he advanced the throttle to 2 500 revolutions per minute (RPM) and commenced with the take-off run. The aircraft rotated and climbed to 1 000 feet (ft) above ground level (AGL) and cruised at 140 miles per hour (mph). It

routed in the direction of the citrus farm to be sprayed, approximately 20 kilometres (km) north of the departure airstrip.

Upon arrival at the citrus farm, which was on the leeside of the mountain, the pilot circled the area to scan for potential obstacles and hazards. Thereafter, he commenced with the first spray-run application. He reported that during this process, the aircraft lost lift due to a sudden downdraft from the mountain and struck the 30-feet (ft) tall citrus treetops with the main wheels and spray boom. Consequently, the aircraft pitched down. The pilot could not recover the aircraft and it crashed on the ground. After the crash, the pilot turned off the master and fuel switches and vacated the aircraft unassisted; he was not injured. The aircraft was substantially damaged.

The accident occurred during daylight at Global Positioning System (GPS) co-ordinates determined to be 32°37'30.0" South 18°56'17.0" East, at an elevation of 442ft.

Figure 1: Aerial view of the approximate accident site (yellow arrow) on the leeside of the mountain. (Source: Google Earth)

Figure 2: The aircraft at the accident site. (Source: Pilot)

Piper PA-36-375 Pawnee Brave Aircraft Description (Source: Pilot's Operating Handbook [POH])

The Piper PA-36-375 Pawnee Brave is a single-seat, full cantilever semi monocoque low-wing, tail wheel type, special purpose agricultural aircraft equipped with a 1 000L chemical hopper behind the engine fire wall with optional sprayer and spreader. The primary structure is made of welded steel tubing truss type fuselage frame with structural redundancy characteristics and progressive collapse and load absorption during a crash scenario. The multiple panel design allows a full disassembly of the structure for inspection or cleaning. The aircraft is powered with a Lycoming IO-720-DIC engine with serial number L-1027-54A rated at 400 horsepower (HP) at 2 650 revolutions per minute (RPM), driving a Hartzell propeller.

The weather information presented in the table below was sourced from the Cape Town International Airport (FACT) Automated Weather Station (AWS).

FACT 240830Z 19004KT 150V220 CAVOK 20/12 Q1020 NOSIG=

Wind Direction	190º	Wind Speed	4 knots	Visibility	9999 m
Temperature	20ºC	Cloud Cover	Nil	Cloud Base	Nil
Dew Point	12ºC	QNH	1020		

Mountain Wave (Source: Federal Aviation Administration [FAA] Advisory Circular [AC] 00-6B)

A mountain wave is an atmospheric wave disturbance formed when stable air flow passes over a mountain or mountain ridge. Mountain waves are a form of mechanical turbulence which develop above and downwind of mountains. The waves remain nearly stationary while the wind blows rapidly through them. The waves may extend 600 miles (1 000km) or more, downwind from the mountain range. Mountain waves often produce violent downdrafts on the immediate leeward side of the mountain barrier. Sometimes the downward speed exceeds the maximum climb rate of an aircraft and may drive the aircraft into the mountainside.

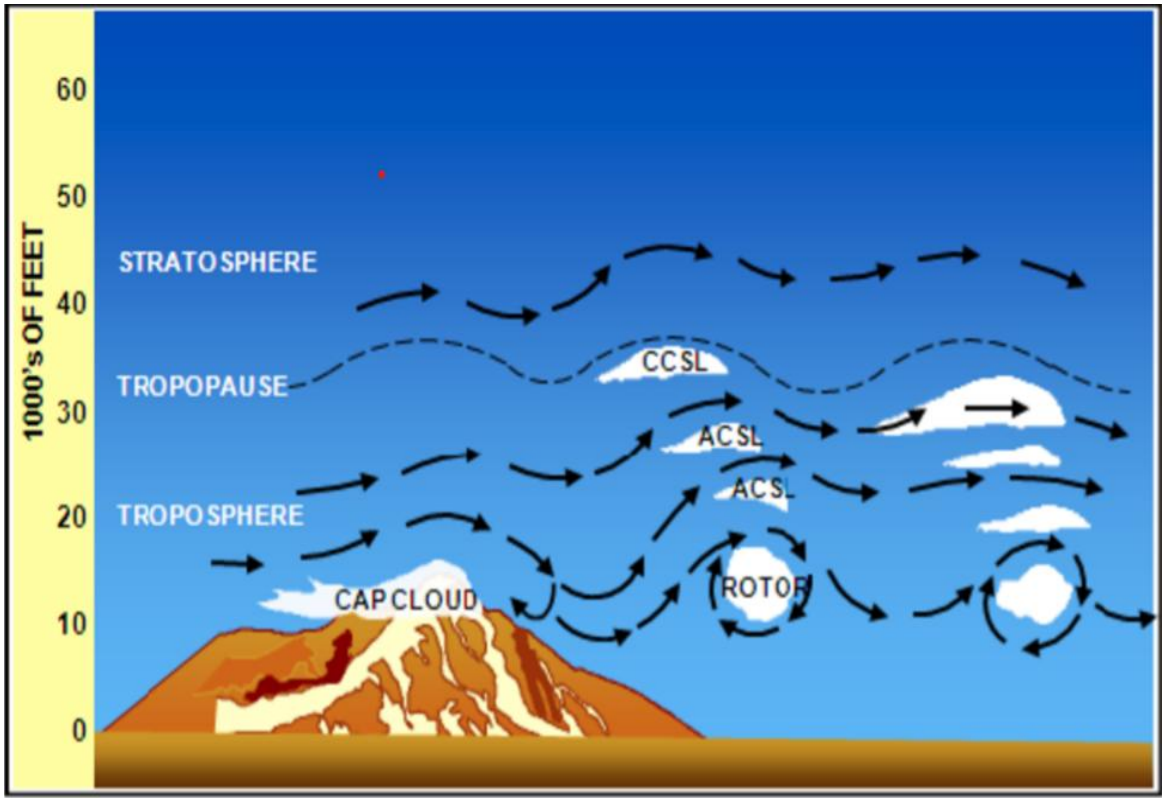

Figure 3: AC 00-06B mountain wave conditions.

Examination of the Aircraft Records and the Pilot's Statement

Examination of the technical records indicated no outstanding defects on the aircraft before it was dispatched to perform the spray-run application. The last 100-hour mandatory periodic inspection (MPI) of the aircraft was conducted on 13 August 2024 at 9 041.0 total airframe hours. Records showed that all the required (scheduled) maintenance was performed, and all the applicable Airworthiness Directives (ADs) and Service Bulletins (SBs) were complied with.

The pilot reported that the engine was 100 percent serviceable and there were no pre-impact mechanical malfunctions or failures that would have precluded normal operation.

Findings

1. Personnel Information

1.1 The pilot had a Commercial Pilot Licence (CPL) that was issued by the Regulator (SACAA) on 29 December 1982. The licence was reissued on 10 July 2024 with an expiry date of 30 April 2025. The pilot had flown a total of 9 871 hours of which 4 717 hours were on the aircraft type.

1.2 The pilot had a Class 1 aviation medical certificate that was issued on 18 December 2024 with an expiry date of 30 June 2025. A limitation was endorsed on the pilot's certificate that he should wear corrective defective near-vision lenses.

1.3 The pilot had the aircraft type and the agricultural crop-spray application ratings endorsed on his licence.

2. Aircraft Information

2.1 The last 100-hour MPI of the aircraft was certified on 13 August 2024 at 9 041.0 airframe hours. The aircraft had accrued 31.01 hours since the last inspection.

2.2 The aircraft maintenance organisation (AMO) that conducted the last inspection of the aircraft was issued an AMO Certificate on 12 July 2024 with an expiry date of 31 July 2025.

2.3 The aircraft's Certificate of Registration (C of R) was issued to the present owner on 13 March 2009.

2.4 The aircraft had the Certificate of Airworthiness (C of A) that was initially issued by the Regulator (SACAA) on 16 May 2014. The latest C of A had an expiry date of 25 May 2025.

2.5 The aircraft's Certificate of Release to Service (CRS) was issued on 13 August 2024 with an expiry date of 12 August 2025 or at 9 140.0 airframe hours, whichever comes first.

3. Meteorological Information

3.1 The aircraft was flown on the lee-side of the mountain where mountain wave activity was prevalent and had, thus, contributed to this accident.

Probable Cause

The aircraft struck the citrus treetops during the crop-spraying application on the leeside of the mountain after experiencing a downdraft which caused it lose height and crash on the ground.

Contributing Factors
None.
Safety Action(s)
Operators and pilots should be aware of the dangers associated with mountain waves when operating in mountainous areas.
Safety Recommendation
None.
About this Report
The decision to conduct a limited investigation is based on factors including whether the cause is known and the evidence supporting the cause is clear, the level of safety benefit likely to be obtained from an investigation, and that will determine the scope of an investigation. For this occurrence, a limited investigation has been conducted, and the Accident and Incident Investigations Division (AIID) has relied on the information submitted by the affected person/s and organisation/s to compile this limited report. The report has been compiled using information supplied in the initial notification, as well as from follow-up desktop inquiries to bring awareness of potential safety issues to the industry in respect of this occurrence, as well as possible safety action/s that the industry might want to consider in preventing a recurrence of a similar occurrence. *All times given in this report are Co-ordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.*
Purpose
In terms of Regulation 12.03.1 of the Civil Aviation Regulations (CAR) 2011 and ICAO Annex 13, this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and not apportion blame or liability.
Disclaimer
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This report is issued by:

Accident and Incident Investigations Division
South African Civil Aviation Authority
Republic of South Africa